S. HRG. 99-705

CONSTRUCTION MANAGEMENT OVERSIGHT ON MAJOR TRANSIT CAPITAL PROJECTS

HEARING

BEFORE THE

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

ON

S. 1931

TO AMEND THE URBAN MASS TRANSPORTATION ACT OF 1964 TO REQUIRE CONSTRUCTION MANAGEMENT OVERSIGHT ON MAJOR CAPITAL PROJECTS

APRIL 9, 1986

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CONSTRUCTION MANAGEMENT OVERSIGHT ON MAJOR TRANSIT CAPITAL PROJECTS

WEDNESDAY, APRIL 9, 1986

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, DC.

The committee met at 9:05 a.m., in room SD-538, Dirksen Senate Office Building, Senator Alfonse M. D'Amato, presiding.

Present: Senators D'Amato, Gorton, Mattingly, Hecht, Cranston, Riegle, Dodd, Dixon, and Sasser.

OPENING REMARKS OF SENATOR D'AMATO

Senator D'AMATO [presiding]. The committee will come to order.

On April 3, 1985, I toured the New York MTA's 63d Street subway tunnel, an $807 million project. Federal taxpayers paid 73 percent of the bill, or $590 million, for this facility. I found a situation that was rather deplorable, a general state of disrepair—broken equipment, cracked concrete blocks, rusted pipes. Moreover, despite the huge sum of money that had been spent, New York transit riders still don't have a usable facility.

November 2, 1985, hearings were held by the Transportation Appropriations Subcommittee regarding the 63d Street Tunnel project. Deficiencies in the Metropolitan Transportation Authority [MTA's] construction management procedures were established as the cause of many of the project's problems. Lack of good quality control and quality assurance practices were among the project's many problems.

Other cities have also had problems with constructing major capital projects. For example, the $207 million Detroit people mover, the $1 billion Miami metro rail project.

Senators Gramm, Dodd, Heinz, and Chafee are cosponsers of S. 1931, a bill which I've introduced, that would require transit grantees to prepare construction management plans as a precondition to receiving Federal funds for major capital projects. Within 120 days after the bills enactment, Urban Mass Transit Administration [UMTA] is to provide guidelines, including a definition of major capital projects to implement the bill.

UMTA also would be authorized to use its funds to hire construction management project oversight firms to serve as the Federal Government's eyes and ears in the field on large projects. UMTA does not now have the ability to effectively oversee the billions of dollars in capital aid which it dispenses.

Fortunately, most grantees have good construction management procedures in place, but this function should not be left to chance. Studies show that the average UMTA engineer in a regional office is responsible for over $750 million in capital projects. The same engineer, working in a regional office with the Federal Highway Administration is responsible for only $83 million in capital projects.

Given these statistics, it is quite clear that you simply cannot expect all new major capital projects to escape the kinds of problems that I mentioned in New York and other areas. The UMTA Administrator, Ralph Stanley, is now in the process of contracting with 10 project management firms, to perform oversight on major capital projects.

This is a step in the right direction, and I want to commend Mr. Stanley for taking it.

My bill would assure that grantees prepare detailed construction management plans for the implementation of their projects. The project management oversight [PMO] firms will then advise UMTA as to whether a grantee is following its approved construction management plan. While construction management plans are needed for all major capital projects, UMTA need not assign a PMO firm to every such project. Discretion will be required in assigning the PMO's.

I will continue to be a firm supporter of Federal aid to mass transit. The intent of this hearing is to make the UMTA Program better. I do not intend to assign blame to troubled projects, but through improved Federal oversight, to strengthen the construction management carried out by grantees. We can do this together. In light of the problems that we've seen in the past, I believe that this is the kind of legislative initiative that will assure that the Federal taxpayer's dollars will be well spent in the future. Senator Hecht.

Senator HECHT. Thank you, Mr. Chairman.

Not too long ago, my staff and I also toured New York's subway system. We came back impressed in one way with the amount of people that are carried by it every day and the need for it. Second, disappointed at some of the conditions. So I'm happy you're having this hearing.

Senator D'AMATO. Senator Gorton.

Senator GORTON. Thank you, Mr. Chairman. I do not have an opening statement.

Senator D'AMATO. Senator Dixon.

OPENING STATEMENT OF SENATOR DIXON

Senator DIXON. Mr. Chairman, I'm pleased to be here this morning, as the Senate Banking Committee considers S. 1931, which will provide additional assurances that construction projects supported by Federal transit capital grants are being managed prudently and efficiently.

We have a distinguished group of witnesses before the committee today, and I look forward to their testimony. We all know the stories of waste and mismanagement that so convincingly demonstrate the need for this type of legislation.

Given the pressure that the Transit Program is under and the general scarcity of Federal funds, we cannot afford to let these practices continue without jeopardizing continued Federal support for mass transit. S. 1931, which requires construction management plans, as a precondition of receiving Federal aid for major capital projects is a reasonable approach, Mr. Chairman, to solving this problem. I congratulate you, Mr. Chairman, for introducing this legislation, and I look forward to continuing to work with you and will hope to see that it's quickly enacted.

Senator D'AMATO. Thank you, Senator. I'm going to ask that my full statement be included in the record, as if read in its entirety.

[The complete prepared statement follows:]

PREPARED STATEMENT OF SENATOR ALFONSE M. D'AMATO

At the outset, I would like to express my gratitude to Chairman Jake Garn who scheduled today's hearing to discuss S. 1931. This bill would require transit grantees to prepare detailed construction management plans as a precondition to receiving Federal assistance for major capital projects. I know that Chairman Garn shares my concern that Federal transit dollars be prudently spent. I appreciate his cooperation in providing a forum for consideration of my bill, and for permitting me to chair the hearing in his absence.

I introduced S. 1931 on December 12, 1985 to address the serious lack of meaningful construction management oversight on major capital projects funded by the Urban Mass Transportation Administration [UMTA]. My distinguished colleagues on this committee, Senators Heinz, Gramm, and Dodd, are original cosponsors of S. 1931. Senator Chaffee is also a cosponsor.

This legislation is an outgrowth of a hearing held on November 2, 1985, in New York City by the Senate Appropriations Subcommittee on Transportation and Related Agencies. That hearing explored the capital program of the Metropolitan Transportation Authority [MTA], especially its problem-ridden, and still unopened, 63rd Street subway tunnel.

The many issues surrounding the 63rd Street subway tunnel include huge cost overruns, lack of proper maintenance, construction delays, questionable field alterations to a support girder, and serious doubts about potential ridership and how the tunnel will be utilized within New York City's transit network. My visit to the tunnel on April 21, 1985, revealed rusted and corroding equipment, cracked cement, water leaks, and a general state of disrepair. It also triggered a chain of events, including the November hearing, my introduction of S. 1931, the MTA's subsequent efforts to improve its internal construction management procedures, UMTA's prioritization of improving its own oversight capabilities, and today's hearing.

New York City, however, is not the only place in the Nation that has experienced problems in constructing a major transit capital project. Miami's metro rail and Detroit's people mover also have run into significant difficulties. The point of this hearing is not to assign blame to any transit grantee, but is to recognize the common thread of deficient construction management and/or project management which has led to costly mistakes in some instances. We must assure that grantees improve these functions, as needed, and guarantee that UMTA has a viable mechanism for overseeing its grantees.

This legislation requires construction management plans to be prepared by grantees and approved by UMTA as a precondition of Federal assistance to build major capital projects. UMTA would be responsible for developing guidelines to implement the bill, including a definition of "major capital project," within 120 days after the bill's enactment. Transit grantees who have done a good job in the past on their major capital projects should not be unduly burdened by this requirement, since they can simply document their current procedures and practices within the context of a plan. All major capital projects should be required to meet this simple requirement in the future. S. 1931 lists several items that constitute minimum plan requirements, including: Quality control and quality assurance procedures; duly adopted budgets; materials testing policies and procedures; qualifications and reporting relationships of staff; construction schedules approved by both the transit agency and the prime contractor; change order procedures; and recordkeeping and document control procedures.

When I drafted this bill, I used the terms "construction management oversight" and "construction management plan". However, after further studying this subject, I believe that "project management oversight" and "project management plan"—broader terms—are more appropriate. The plan components listed in S. 1931 encompass more than just the construction phase of a project. Moreover, UMTA is now in the process of contracting with 10 project management oversight [PMO] firms to assist it with the oversight of major capital projects. Therefore, when this bill is marked up, I will move to substitute the term project management for construction management. I also will try to include a provision to require UMTA to approve or disapprove these required plans within 60 days. The provision will state that if UMTA cannot meet this deadline, it must supply the reasons therefore; if UMTA disapproves a plan, it also must supply its reasons to the grantee.

In the past, UMTA's involvement with troubled projects too often has been "after the fact" to discover what went wrong or to address an ongoing crisis. In general, UMTA's oversight has been insufficient to spot problems before they become expensive errors. Fortunately, many grantees have adopted sufficient project management practices on their own, so UMTA's shortcomings in this area have not come to light. However, the efficacy of UMTA's important oversight function cannot be left to the chance that grantees will have good procedures in place.

The intent behind S. 1931 is to change UMTA's role from one of performing ad hoc post-mortems on troubled projects or of administering emergency first-aid to projects in crises, to one of meaningful oversight on projects involving billions of taxpayers dollars. Under my bill, UMTA would have a permanent statutory authorization to contract directly for the systematic performance of construction management oversight. Currently, UMTA's power to spend funds for this activity has been left to the annual appropriations process, which in FY 1986 allocated one-half of 1 percent of UMTA funds for the PMO program. S. 1931 would provide the Secretary of Transportation with the power to determine how much of UMTA's funds are needed to run the PMO program.

The manner in which UMTA utilizes PMO firms, its "eyes and ears" in the field, is up to UMTA. Certainly, UMTA's 20 years of experience will inform its decisions on how to best use these firms. As the PMO program gets started, UMTA may want to assign PMO's to all major capital transit projects. The degree of oversight by a PMO firm would vary according to the complexity and expense of a project, as well as by the grantee's experience in carrying out similar projects.

The ability to bring PMO's on board will provide UMTA with the expertise it desperately needs to watch over multimillion dollar projects. Since these outside firms will be paid by UMTA, not by the grantee, there is a greater probability of unbiased work. The best interests of the public are served by eliciting impartial recommendations from PMO firms, and the best way to secure impartiality is for UMTA, rather than its grantees, to pay the PMO's.

I have always been an enthusiastic and vocal supporter of the Federal commitment to public mass transit. Transit continues to be a necessity to millions of the Nation's poor, elderly, and handicapped citizens, who rely on efficient and affordable transit service to get to work, to school, and to carry on their daily lives. Our large urban centers depend on public transit to transport large numbers of passengers quickly and cleanly, relieving city streets of the congestion and pollution caused by too many private vehicles. Smaller towns and nonurban areas also depend on the vital transportation link provided by transit services which are adaptable to meet the needs of different areas.

In the future, additional major transit capital projects will be needed to extend the benefits of transit to areas currently without service, and to modernize and improve transit systems already in place. Transit advocates will be relying on the commitment of the Federal Government to help localities build these projects. Enactment of S. 1931 will help safeguard continued Federal participation in these projects by providing assurance that Federal dollars will be prudently spent. I am convinced that this logical requirement—a well-planned, solid construction/project management plan prior to approval of the first Federal dollar for a project, will both help UMTA do its job and deliver better, less expensive projects to the riding public.

In the past, I have called the 63rd Street subway tunnel the "Tunnel to Nowhere," because it deadends without linkage to other subway lines and because of its dismal history. However, I now think that there is light at the end of this tunnel. It has become the catalyst for improving the Federal oversight of major capital projects and for improving the handling of such projects by local grantees.

Good management of projects and of their construction will raise the quality of projects delivered to the public. I believe that the safeguards contained in S. 1931 are vital to the UMTA program, therefore, I will incorporate its provisions within another bill which I will soon introduce to reauthorize the entire Federal Transit Program. The passage of S. 1931, either as a freestanding bill or within the context of extending the UMTA program, will require grantees to re-examine their existing practices and procedures. I believe that better planning, design, and execution of major capital projects will follow.

[Copy of proposed bill S. 1931 follows:]

II

99TH CONGRESS
1ST SESSION

S. 1931

To amend the Urban Mass Transportation Act of 1964 to require construction management oversight on major capital projects.

IN THE SENATE OF THE UNITED STATES

DECEMBER 12 (legislative day, DECEMBER 9), 1985

Mr. D'AMATO (for himself, Mr. GRAMM, Mr. DODD, and Mr. HEINZ) introduced the following bill; which was read twice and referred to the Committee on Banking, Housing, and Urban Affairs

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A BILL

To amend the Urban Mass Transportation Act of 1964 to require construction management oversight on major capital projects.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Urban Mass Transportation Act of 1964 is amended by adding at the end thereof the following new section:

"CONSTRUCTION MANAGEMENT

"SEC. 23. (a)(1) The Secretary is authorized to use Federal funds available under this Act, section 103(e)(4) of title 23, United States Code, and section 14(b) of the National Capital Transportation Act of 1969, in an amount determined by the Secretary, to contract directly for the performance of construction management oversight. The Federal share of any such contract shall be 100 per centum.

"(2) Each recipient of assistance under this Act, section 103(e)(4) of title 23, United States Code, or section 14(b) of the National Capital Transportation Act of 1969 shall provide a contractor chosen by the Secretary in accordance with paragraph (1) such access to its construction sites and records as may be reasonably be required.

"(b) As a condition of Federal financial assistance for a major capital project under this Act, section 103(e)(4) of title 23, United States Code, or section 14(b) of the National Capital Transportation Act of 1969, the Secretary shall require the recipient to prepare and, after approval by the Secretary, implement a construction management plan which meets the requirements of subsection (c).

"(c) At a minimum, a construction management plan shall provide for—

"(1) adequate recipient staff organization complete with well-defined reporting relationships, statements of functional responsibilities, job descriptions, and job qualifications;

"(2) a duly adopted budget covering the construction management organization, appropriate consultants, property acquisition, utility relocation, systems demonstration staff, audits, and such miscellaneous payments as the recipient may be prepared to justify;

"(3) a comprehensive construction schedule approved by both the recipient and the prime contractor on the project;

"(4) a document control procedure and recordkeeping system;

"(5) a change order procedure which includes a documented, systematic approach to the handling of construction change orders;

"(6) organizational structures, management skills, and staffing levels required throughout the construction phase;

"(7) quality control and quality assurance functions, procedures, and responsibilities for construction and for system installation and integration of system components;

"(8) materials testing policies and procedures;

"(9) internal plan implementation and reporting requirements; and

"(10) criteria and procedures to be used for testing the operational system or its major components.

"(d) Not later than 120 days after the date of enactment of this section, the Secretary shall issue guidelines or regulations to implement this section. Such guidelines or regulations shall define the term 'major capital project' for the purpose of subsection (b).".

○

Senator D'AMATO. In order to save time, I'm going to ask our panel to summarize their remarks and keep them down to 5 minutes.

Our first panel will include the UMTA Administrator, Ralph Stanley. Ralph, it's good to see you.

Carmen Turner, general manager of the Washington Metropolitan Area Transportation Authority, also is on the panel. I understand that both Carmen and Ralph will be called upon to testify on the Hill over on the House side later this morning. Lloyd A. Duscha, Deputy Director of Engineering and Construction, U.S. Army Corps of Engineers, is the third member of the panel.

It's good to see you all. We're glad that you can be with us. Mr. Stanley.

STATEMENT OF RALPH L. STANLEY, ADMINISTRATOR, URBAN MASS TRANSPORTATION ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION

Mr. STANLEY. Thank you, Mr. Chairman. I am pleased to have the opportunity to appear before you today to discuss S. 1931, a bill that would amend the UMT Act to require construction management oversight on major transit capital projects.

THE TRANSIT PROGRAM

If continued in its current form, I think the provisions of S. 1931 could be critical to our continued effective oversight of the program. As you know, I testified before you last November about the New York City Transit Authority's management of federally funded projects. The project management difficulties we discovered there and in other projects caused us to take a serious look at the issue of what is the appropriate role for UMTA to play in project management oversight of federally funded projects. To assist us in determining the options available to provide project management oversight, we reviewed our own procedures and those of other Federal agencies. The critical issue in our review was to define the role and interest the Federal Government has in overseeing construction projects, whether they involve waste-water treatment facilities, airport projects, or highway, or mass transit projects.

Our review indicated that the Federal agencies were generally consistent in the way they saw the Federal role. The local government which received the funding performed all direct and routine project management functions, including construction management. The Federal agencies reviewed the progress of the local governments to ensure that the Federal investment was being prudently managed.

The agencies did not generally monitor day-to-day project work, but they did review progress reports, budget documents, quality control records and the like and conducted occasional site visits. In other words, the Federal agencies saw their roles as oversight, not direct construction management.

We concluded that it was important for UMTA to be able to independently monitor the oversight of significant projects.

With your support, Mr. Chairman, we have been implementing a national Project Management Oversight Program for our major capital projects. One of the significant aspects of the program is that we have not increased our staff levels. Instead, UMTA assigns independent contractors paid for and directly reporting to UMTA to perform a project management oversight function on major capital projects that require more intensive oversight than do routine projects. Our major problem in implementing this program was the fact that we were not, by law, authorized to use our large capital program funds for independent oversight. Rather, we had to use our research and study program funds for this purpose, and thus were limited in the number of projects we could apply the program to.

This situation was resolved with the enactment of the Department of Transportation's fiscal year 1986 Appropriations Act, which authorized us, for this year, to use a portion of the funds available under all of our capital programs to contract directly with consultants for project management oversight. This authority, unfortunately, expires at the end of this fiscal year.

S. 1931 would enact into permanent law the authority UMTA would need to use funds available under all of our major capital programs to contract directly for construction management oversight contractors on major capital projects. In addition, the bill would require UMTA grantees to prepare detailed construction management plans on major capital projects. These plans would have to be approved by UMTA and implemented by the grantees.

PROJECT MANAGEMENT PROGRAM

To emphasize how necessary we think this function is, let me outline for you what we are now doing under our Project Management Program with the new funding sources made available by Congress. We have used the competitive procurement process to establish a stable of contractors for consulting engineering sources and have chosen 10 highly qualified firms that will be under task order contracts. Within these contracts, UMTA will then assign work orders for a specific project to a contractor. These work orders will be tailored to meet the oversight needs of the specific major capital project or a program of projects for a major grantee.

The overall objective of these contractors is to assure UMTA that the grantee's project is properly staffed, managed, and executed in accordance with established procedures, plans, specifications, and principles in a timely manner.

We already have a number of specific tasks for those contractors to perform. These include reviewing preliminary project documents and undertaking selected interviews; reviewing the granter's own Project Management Program, monitoring a grantee's final design, monitoring the grantee's functions during the startup and construction as they relate to control of project costs, schedule, and quality. The contractors will report to us on a monthly basis with midmonthly updates. A final report will be given to us 30 days after the conclusion of the final task. It will summarize the highlights of the project and specifically describe any outstanding issues and give a complete assessment of the effectiveness of the grantee's project management.

We have chosen a number of projects that will be under this program. These projects generally are either subject to full funding contracts or have a net project cost of over $100 million.

In short, we are pleased with the way the program is developing. We think it will be extremely useful. It will prevent the sort of project management problems we have found in New York, Miami, Detroit, and other areas.

If Congress does not restructure the transit program in the manner we have proposed in the administration's legislation, we think the Federal investment in mass transit will be significantly enhanced by a continuation of this Project Management Oversight Program as proposed in your bill.

Before closing, I would like to make a technical comment about the bill. It provides 10 specific tasks that each grantee's construction management plan would be required to have, at a minimum. We think there will be cases where not all 10 items would be necessary and would like to have some flexibility to determine which tasks are necessary for which projects.

We'd be pleased to discuss that with your staff.

In closing, Mr. Chairman, I want to thank you again for your support for our Project Management Program in the past and your continued efforts, as embodied in S. 1931. And I'll be glad to answer any questions you might have.

[The complete prepared statement follows:]

Senator D'AMATO. Mr. Stanley, we thank you not only for your testimony, but more importantly for taking the necessary preliminary steps to improve UMTA's oversight capabilities. When the legislation is passed, and I am confident it will pass, UMTA will have ready a plan for its implementation. The subcommittee is gratified to see that you've already begun to put an actual plan into effect. And as I say, we don't want to stop mass transit. We want to assure the kind of quality control and the kind of performance that will, indeed, attract support to the program.

So we thank you for your testimony and for the work you've already begun.

Ms. Turner, I am glad to see you here.

STATEMENT OF CARMEN TURNER, GENERAL MANAGER, WASHINGTON METROPOLITAN AREA TRANSPORTATION AUTHORITY [WMATA]

Ms. TURNER. Thank you very much. Good morning, Mr. Chairman, members of the committee. I am pleased that I have an opportunity to testify here this morning concerning S. 1931. I'd like to submit my testimony for the record and to highlight parts of it.

First of all, let me say, as the general manager of Metro and representing the Washington Transit Authority, that we support the bill in principle and believe that the Federal Government, given the investment in rail construction and other major construction projects, must have some oversight authority. We believe also, and I am pleased to hear Mr. Stanley say that this is one of his objectives, that the type and amount of oversight should be tailored to the project and should be based on the performance and the experience of the transit authority.

We are also interested in the level of resources which will be utilized for construction management oversight. We are concerned that funds desperately needed for bricks and mortar not be diverted to construction management oversight. We are concerned, particularly, that the Stark-Harris authorization not be a funding source for this program and that funds available for construction management oversight for Washington Metro be drawn from another source.

As I said earlier, we are pleased to be here. We see this as a very, very important step and congratulate you on taking the initiative to move this bill forward.

Thank you very much for the opportunity to testify.

[The complete prepared statement follows:]

STATEMENT OF RALPH L. STANLEY
ADMINISTRATOR OF THE
URBAN MASS TRANSPORTATION ADMINISTRATION
BEFORE THE COMMITTEE ON
BANKING, HOUSING AND URBAN AFFAIRS OF THE UNITED STATES SENATE
ON APRIL 9, 1986

Good morning Mr. Chairman. I am pleased to have this opportunity to appear before you today to discuss S. 1931, a bill that would amend the Urban Mass Transportation Act to require construction management oversight on major transit capital projects.

Before discussing the bill, however, I particularly want to emphasize that the Administration has proposed a major restructuring of the transit program. I will be testifying about our legislative proposal before this Committee next week, but the point I want to make today is that under our block grant we propose a significant shifting of responsibilities from the Federal level to the States and urbanized areas. State and local officials would decide where Federal funds would be spent, and even whether they should be spent on highway or transit projects. In this framework, the States and recipients would principally be responsible for administering and monitoring projects and the Federal role essentially would be to audit completed projects to make certain that Federal requirements had been met.

If, however, Congress continues the transit program generally in its current form, then I think that the provisions of S. 1931 would be critical for our continued effective oversight of the program. As you know, Mr. Chairman, I testified before you last November about the New York City Transit Authority's management of federally funded projects. The project management difficulties we discovered there and in other projects caused the Urban Mass Transportation Administration (UMTA) to take a serious look at the issue of what is the appropriate role for UMTA to play in project management oversight of federally funded projects. To assist us in determining what options were available to provide project management oversight, we reviewed our own procedures and those of other Federal agencies on large construction projects.

The critical issue in our review was to define the role and interest the Federal Government has in overseeing construction projects, whether they involve waste water treatment facilities, airport expansion activities, highways or mass transit construction. Our review indicated that the Federal agencies were generally consistent in the way they saw the Federal role. The local government which received the funding performed all direct and routine project management functions, including construction management. The Federal agencies reviewed the progress of the local governments to ensure that the Federal investment was being prudently managed. The agencies did not generally monitor day-to-day project work. But they did review progress reports, budget documents, quality control records, and the like, and conducted occasional site visits. In other words, the Federal agencies saw their roles as oversight, not direct construction management. We concluded that it was important for UMTA to be able to independently monitor the oversight of significant projects.

With your support, Mr. Chairman, we have been implementing a national project management oversight program for major capital projects. One of the significant aspects of the program is that we have not increased our staff levels. Instead, UMTA assigns independent contractors, paid for and directly reporting to UMTA, to perform a project management oversight function on major capital projects that require more intensive oversight than do routine projects. A major problem in implementing this program was the fact that we were not by law authorized to use our large capital program funds for independent oversight. Rather, we had to use our research and study program funds for this purpose and thus were limited in the number of projects we could apply the program to. This situation was resolved for this fiscal year with the enactment of the Department of Transportation's FY 1986 Appropriations Act, which authorizes us to use a portion of the funds available under all of our capital programs to contract directly with consultants for project management oversight. This authority expires at the end of this fiscal year.

S. 1931, however, would enact into permanent law authority for UMTA to use funds available under all of our major capital programs to contract directly for construction management oversight contractors on major capital projects. In addition, the bill would require UMTA grantees to prepare detailed construction management plans on major capital projects. These plans would have to be approved by UMTA and then implemented by the grantees.

To emphasize how necessary we think this project management oversight function is, let me outline for you what we are now doing under our project management program with the new funding sources made available by Congress. We have used the competitive procurement process to establish a stable of contractors for consulting engineering services, and have chosen ten highly qualified firms that will be under task order contracts. Within these contracts, UMTA will then assign work orders for a specific project to a contractor. These work orders will be tailored to meet the oversight needs of the specific major capital project or a program of projects for a major grantee. The overall objective of these contractors is to assure UMTA that the grantee's project is properly staffed, managed, and executed in accordance with established procedures, plans, specifications, and principles in a timely manner.

There are a number of specific tasks that the contractors will be asked to perform. These include reviewing preliminary project documents and undertaking selected interviews; reviewing the grantee's own project management program; monitoring a grantee's final design stage; and monitoring of a grantee's functions during start-up and construction as they relate to control of the project costs, schedule, and quality. The contractors will report to us on a monthly basis, with mid-monthly updates. A final report will be given to us 30 days after the conclusion of the final task. It will summarize the highlights of the project, specifically describe any outstanding project issues, and give a complete assessment of the effectiveness of the grantee's project management.

We have chosen a number of projects that will be under this program. Generally, these are projects that are either subject to full funding contracts or that have a net project cost over $100 million.

In short, we are pleased with the way the program is developing and we think that it will be extremely useful. It will help prevent the sorts of project management problems found in New York, Miami, Detroit, and other areas. If Congress does not restructure the transit program in the manner we have proposed, we think the Federal investment in mass transit funding will be significantly enhanced by a continuation of this project management oversight program as proposed in S. 1931.

Before closing, I would like to make a technical comment about the bill. It provides ten specific tasks that each grantee's construction management plan would be required to have at a minimum. We think there will be cases where not all ten items would be necessary, and would like to have some flexibility in determining which tasks would be necessary on each project. We would be pleased to discuss this with your staff.

In closing, Mr. Chairman, I want to thank you for your support in the past for our project management program and your continued efforts as embodied in S. 1931.

I would be glad to answer any questions you may have.

STATEMENT BY CARMEN E. TURNER
GENERAL MANAGER
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
BEFORE
COMMITTEE ON BANKING, HOUSING
AND URBAN AFFAIRS
UNITED STATES SENATE
APRIL 9, 1986

Mr. Chairman and members of the Committee, I am pleased that you invited me to testify before you today about Senate Bill 1931 which deals with construction management planning and oversight in major transit construction projects. Having an effective construction management program is essential to assuring quality construction and minimum cost, and I firmly believe that there is a clear Federal interest in ensuring that Federal dollars are spent wisely on major transit construction projects. I therefore agree in principle with the need for construction management planning and oversight as called for in this bill.

I have carefully reviewed all the provisions of the proposed bill, and I believe that it is a thoughtful, reasonable, and straightforward means of addressing an extremely important issue. I have paid particular attention to the ten elements of a construction management plan as called for in Section 23(c). I believe that each of the items described is an important part of an effective plan and that the consideration of each of the issues involved is a necessary prerequisite to the implementation of a successful construction project.

I would particularly emphasize the importance of the staffing required to assure that construction is properly managed, as identified in Section 23(c)(6). Our experience at Metro has strengthened our conviction that it is the competence and dedication of the people who manage the project that really determines the integrity and quality of the construction effort.

Section 23(c)(7) also recognizes that a transit construction project results in an operating system, not just a facility. Planning well in advance for system installation and integration and assuring that adequate time and resources are programmed for thorough operational testing prior to revenue service are keys to the development of a safe and reliable system. It is all too easy to focus so heavily on the bricks and mortar that we lose sight of the intricate relationships of the many components which make the system run.

CONSTRUCTION MANAGEMENT AT WMATA

I am particularly pleased to be here today to discuss this bill in the context of the Washington Metrorail construction program which has been under way for over 17 years and has been characterized by some as the largest single public works construction project ever undertaken in this country. We have already completed $5 billion in construction and have half a billion dollars of construction currently under way. The quality of this construction has been exceptional, and the Metrorail construction program has been recognized internationally as a model. I believe that our reputation is reflective of the high quality of our design and construction management effort, the skill and dedication of our staff, and the cooperation and commitment of our numerous contractors. Moreover, it demonstrates that a major construction project undertaken by the public sector can be accomplished with the highest degree of integrity and technical competence, resulting in a quality product.

Senator D'AMATO. Thank you very much. Mr. Duscha.

STATEMENT OF LLOYD A. DUSCHA, DEPUTY DIRECTOR, ENGINEERING AND CONSTRUCTION, U.S. ARMY CORPS OF ENGINEERS

Mr. DUSCHA. Thank you, Mr. Chairman.

As I understand the purpose of S. 1931, it is to require construction management plans as a precondition to Federal funding for major transit capital projects and these plans would then form a basis for controlling cost growth.

One cannot dispute the intrinsic value of construction management plans. If nothing else, the required development of such a plan forces an entity to look into the procedures inherent within that organization, including the assignment of control and responsibilities. This is especially true of organizations which have not been confronted previously with administering a major capital improvement project or which do not have an adequately staffed organization with valid established procedures for acquiring capital improvements. In other words, I believe that the requirements of the construction management plan should be varied, based on the capabilities of the recipient organization and with the complexities of the project.

CORPS USES PLANS SIMILAR TO S. 1931

The U.S. Army Corps of Engineers presently uses construction management plans similar to those of S. 1931 for some projects. We have found such plans to be effective management tools to protect the Government's interest. A formal construction plan is used on many major projects, regardless of whether such project is being built for ourselves or for our other customers. In fact, detailed management plans were used for the construction of two large air bases in Israel, for the various facilities we have done in Saudi Arabia, and for the Air Force where the customer was closely involved in the design and the construction phase. In support of improving our own construction management, the Corps of Engineers recently conducted an indepth evaluation of its own quality assurance and management processes. The evaluation included a review of the functions, systems, missions, regulations, procedures, and resources which contribute to the overall effort of attaining a quality product within time and cost limits. We believe such periodic reviews are necessary to adjust the system to present day needs.

Turning to the specifics of the proposed legislation, the phraseology of the bill implies that a formal construction management plan in effect during the construction phase only will produce a quality product, control costs, and ensure timely completion.

I would like to stress our belief that the level of quality is established during the engineering and design phase and formalized in the construction documents. This preconstruction phase warrants equal management attention as it sets the stage for many difficulties that may be encountered during the construction phase.

NEED FOR ADEQUATE FRONT END OVERSIGHT

We have found that an adequate investment in time and manpower at the front end of a job, in developing contract plans, contributes much to reducing cost overruns during construction.

We suggest that the construction management plan include a requirement for the construction management oversight contractor to become involved during the early design phase of the project. This we feel would go a long way toward assuring quality, containing costs, and reducing time growth.

The proposed bill specifies the amount of the Federal shares as 100 percent for funding the construction management oversight contract but is silent on the reasonable limit that this effort should cost. Although those services could approximate 2 to 3 percent of the construction cost depending on scope, I think you will find that the benefits gained from such an investment are usually returned in saved cost growth and an increased quality of the product.

On the matter of the guidelines or regulations to be issued by the Secretary of Transportation to implement this legislation, the use of a separate construction management oversight contract results in two channels of authority which may not be mutually exclusive.

There is the relationship between the Secretary of the Department of Transportation, as the contract administrator of the construction management oversight contractor, and the Secretary's relationship with the recipient agency through the funding conduit.

There is also the relationship between the construction management oversight element and the recipient agency, which becomes the eventual contracting officer for the construction contractor.

The implementing guidance must be clear on the lines of responsibilities and authorities accruing to each of these elements and must provide a means for making changes to the construction management plans as such needs dictate. If accountability is not clearly defined, the best formulated management plans will not be successfully implemented.

To assure that the quality level requirements are introduced early in the project development process, we believe the guidelines should emphasize the initial investment of qualified personnel and monetary resources during the early design phases and be continued through final design to construction and project acceptance.

QUALITY CONTROL AND ASSURANCES

Next, I would like to comment on some of the components of the plan, as contained in the proposed bill.

Subsection (c), item (1) describes the elements of a good organizational plan, but I would suggest that it be expanded to include the structure, management skills, and staffing levels required throughout the design and construction phase.

Item (5), pertaining to change order procedures, should include instructions for handling contractors' claims and disputes. The instructions should describe methods of administering claims and disputes without delaying construction and the authority of the construction management contractor in administering changes, claims, and disputes.

My final comment has to do with the Quality Control and Quality Assurance Program. The Corps of Engineers holds the contractor responsible for quality control and uses quality assurance procedures to evaluate the effectiveness of the contractor's Quality Control Program.

Basic to a Quality Assurance Program is quality assurance testing. This is the minimum level of testing necessary to assure with confidence that the contractor is meeting the contract requirements.

For the recipients to have an effective Quality Assurance Program, the quality assurance plan should include the requirements stated in items (8) and (10) of the plan.

This completes my testimony.

[The complete prepared statement follows:]

CONSTRUCTION MANAGEMENT PLAN

We reviewed S 1931 with respect to WMATA's compliance with its provisions and concluded that not only does the construction management program at WMATA include all of the elements called for in the plan under Section 23(c), but each of the areas is thoroughly documented. During our discussions with UMTA relative to a full funding contract we reviewed our construction management activities and, I believe, satisfied them that our process is appropriate.

A well conceived construction management plan is essential to ensure quality construction. It serves a primary function of assuring efficient and cost effective management of the project as well as being the basis for Federal review and oversight. To be effective, however, it must be perceived by the manager as constructive and useful. Therefore, the requirements for such a plan should be tailored to the size and nature of each project, as well as its state of development.

We do have some concerns about how the implementation of this bill might affect a project such as ours which is already well under way. Passage of this bill should not introduce yet another requirement which might further delay an ongoing construction program. In applying this legislation to ongoing projects, it may be appropriate either to exempt from the review of Section 23(b) construction programs which are well advanced and have a proven track record, or to scale the degree of plan review and oversight to correspond with the evidenced adequacy of the existing program. Further, we urge that a provision be made to assure continued funding for ongoing projects during any review, thereby avoiding costly delays.

CONSTRUCTION MANAGEMENT OVERSIGHT

As I have said previously, I believe that it is necessary for the Federal government to protect its substantial interest in major construction projects through effective construction management oversight. Construction management oversight should be compatible with and complement project management. It should focus upon assisting the transit authority in executing its management plan and should result in a high quality product within budget and on schedule. The required resources to support that oversight effort are a significant issue. With limited resources available for transit construction projects we must be careful not to use a disproportionate amount for oversight. We should not lose sight of the fact that our real goal is bricks and mortar, not paperwork.

Section 23(a)(2) authorizes funding for oversight contractors from various existing funds. In most cases this will not affect specific construction projects, since funds will be drawn "off the top" from appropriations, and will not really reduce the funding for the project. The situation for WMATA, however, is unique, in light of the Stark-Harris Authorization. Any dollars used for the oversight contractor would reduce those available for actual construction. Since our full authorization is programmed, this would have an impact upon WMATA which would not occur for other systems. Funds from any other of the resources identified could be used equally well to pay for the UMTA contractor reviewing WMATA activities. We therefore respectfully request that reference to the National Capital Transportation Act of 1969 be deleted
from Section 23(a)(2)

CONCLUSION

Mr. Chairman, I very much appreciate this opportunity to comment on S.1931. I believe that this is an important issue and I applaud you for taking the initiative in this area. I would like to offer WMATA's information, knowledge, and staff resources to assist the Federal officials who will prepare the implementing guidelines, and to consult with any transit authorities which develop plans to comply with this legislation. I hope that my comments have been helpful to you.

STATEMENT OF LLOYD A. DUSCHA
DEPUTY DIRECTOR OF ENGINEERING AND CONSTRUCTION
U.S. ARMY CORPS OF ENGINEERS

Mr. Chairman and members of the committee.

I am Lloyd A. Duscha, Deputy Director of Engineering and Construction, in the Office, Chief of Engineers. I am appearing on behalf of Mr. Robert Dawson, Assistant Secretary of the Army for Civil Works, who was invited to testify on S. 1931. Mr. Dawson is out of the country and unable to appear before this committee.

As I understand, the purpose of S. 1931 is to require construction management plans as a precondition to Federal funding for major transit capital projects. These plans would form a basis for controlling cost growth.

Being unfamiliar with the detailed operational aspects of constructing major capital projects in the transit field, my comments will be generic based on the experience of the Corps of Engineers in constructing both major and minor capital projects in the civil works and military construction fields.

One certainly cannot dispute the intrinsic value of construction management plans. If nothing else, the required development of such a plan forces an entity to look into the procedures inherent within an organization, including the assignment of control and responsibilities. This is especially true for organizations which have not been confronted previously with administering a major capital improvement project, or which do not have an adequately staffed organization with established procedures in place for acquiring capital improvements.

The United States Army Corps of Engineers presently uses construction management plans similar to those proposed in S. 1931. We have found such plans to be effective management tools to protect the Government's interest. A formal construction management plan is used on many major projects and on every hospital project regardless of whether such project is being built for ourselves as with our Civil Works program, or for the Army, Air Force, EPA, or other customers. Detailed management plans were used for the construction of two large air bases in Israel and for the various facilities in Saudi Arabia where the customer was closely involved in the design and construction. In support of improving construction management, the Corps of Engineers has recently conducted an in-depth evaluation of its quality assurance and management process. The evaluation included a review of the functions, systems, missions, regulations, procedures and resources which contribute to the overall effort of attaining a quality product within time and cost limits. Such periodic reviews are necessary to adjust the system to present day needs.

Turning to the specifics of the proposed legislation, the phraseology of the Bill implies that a formal construction management plan in effect during the construction phase only will produce a quality product, control costs and ensure timely completion. I would like to stress our belief that the level of quality is established during the engineering and design phase and formalized in the construction contract documents. This preconstruction phase warrants equal management attention as it sets the stage for any difficulties that may be encountered during the construction phase. We have found that an adequate investment in time and manpower at the front end of a job, in developing contract plans, contributes much to reducing cost overruns during construction. We suggest that the construction management plan include a requirement that the construction management oversight contractor become involved during the early design phase of the project. This will go a long way toward ensuring quality, containing cost and reducing time growth.

The proposed bill specifies the amount of the Federal share as 100 percent for funding the construction management oversight contract but is silent on a reasonable limit that this effort should cost. The Committee should be aware that costs for the requisite services could approximate 3-5 percent of the construction cost, depending on the scope. It has been found, however, that the benefits gained from such investment are usually returned in saved cost growth and increased quality. It will also be necessary for the Department of Transportation to provide staff for oversight and administration of the construction management contract.

The next issue relates to the subsequent guidelines or regulations to be issued by the Secretary of Transportation to implement this legislation. The use of a separate construction management oversight element results in two channels of authority which may not be mutually exclusive. There is the relationship between the Secretary of the Department of Transportation as the contract administrator of the construction management oversight contractor and the Secretary's relationship with the recipient agency through the funding conduit. There is also the relationship between the construction management oversight element and the recipient agency, which eventually becomes the contracting officer for the construction contractor. The implementing guidance must be clear on the lines of responsibilities and authorities accruing to each of the elements and must provide a means for making changes to the construction management plan as needs dictate. If accountability is not clearly defined, the best formulated management plans will not be successfully implemented.

To assure that quality level requirements are introduced early in the project development process, we believe the guidelines should emphasize the initial investment of qualified personnel and monetary resources during the early design phases and continued through final design, to construction and project acceptance.

Next, I would like to comment on some of the components of the construction management plan as contained in the proposed bill. Subsection (c), item (1) describes the elements of a good organizational plan but would suggest that it be expanded to include organizational structures, management skills, and staffing levels required throughout the design and construction phase. It should include a staffing plan which defines selection criteria for recruiting management personnel who possess

the skills and talent necessary to meet job requirements. It would appear the items (6) through (9) should be incorporated with item (1) as part of the recipient staff organization. If the intent of items (6) and (9) is that these are separate elements of the plan not pertaining to the recipient organization, this should be clarified.

Item (5) pertaining to change order procedures should include instructions for handling contractors claims and disputes. The instructions should describe methods of administering claims and disputes without delaying construction and the authority of the construction management contractor in administering changes, claims and disputes.

My final comment has to do with the quality control and quality assurance program. The Corps of Engineers holds the contractor responsible for quality control and uses quality assurance procedures to evaluate the effectiveness of the contractor's quality control program. Basic to a quality assurance program is quality assurance testing. This is the minimum level of testing necessary to assure with confidence that the contractor is meeting the contract requirements. For the recipient to have an effective quality assurance program, the quality assurance plan should include the requirements stated in items (8) and (10).

This completes my testimony. I would be happy to answer your questions.

Senator D'AMATO. Thank you very much.

Mr. Stanley, Mr. Duscha has testified, he believes it is very important that there be a CMO early on during the design of the project. Problems are said to arise because there is no adequate review of design work and engineering details early on—would you care to comment on that?

Mr. STANLEY. We have used the term, Senator, project management oversight, and I think as we initiate the projects, we would like to have whichever firm we select and assign to get involved as early as possible and as early as the design stage.

Our experience in Detroit and in Miami traces some of the problems we found there all the way back to design decisions and engineering decisions that were made.

So I would endorse our getting involved as early as possible.

Senator D'AMATO. Mr. Duscha, I am wondering if I might ask you to give us some material in addition to the testimony that you have provided. On most projects a great deal of work will have been undertaken, possibly including some in-house design and engineering work, prior to the construction phase of the projects.

My question is: At what point prior to the award of the contract would you initiate the oversight function?

We don't want to bog down the progress of constructing major capital projects. We want to get the projects underway. However, I think there has been demonstrated ample need to see to it that there is the kind of scrutiny that in the long run will assure that we maximize the use of Federal dollars.

I would be interested in more details on these points.

Mr. STANLEY. Mr. Chairman, design and engineering of major projects, and for that matter, minor projects, is an evolving developmental process transcending from the definition of a problem to be solved, to a vision of how it may be solved, to analyzing alternatives for solution, to developing a concept plan, through preliminary plans, into final construction plans, through execution of the construction phase and resulting in the final product. Review is a continual process and the review requirements for each of these stages are different and tend to dictate how the next stage will be affected and how it should proceed. Each project has its individual peculiarities and the method of dealing with those has to be adjustable. Organizations dealing with major projects should be staffed with sufficient and appropriate engineering capability to make the proper choices under the circumstances. I want to stress that there is no one plan which fits all circumstances, and that any plan must be administered on a continual basis.

One hears much about review bogging down the process. Close scrutiny would reveal that, even under protracted reviews, the time involved in that process compared to the total process of bringing a project to fruition is quite small. In any case, if properly handled and timed, the review period should not be consequential and should be a planned event in the time chain. I am convinced that to neglect the review will, in the long run on an overall basis, lead to greater cost and time growth on projects than if proper reviews were made. As I continue to emphasize, however, the degree of such review is a judgmental matter.

Senator D'Amato. We have been joined by my colleagues, Senator Riegle and Senator Sasser.

Senator Riegle, do you have any questions?

Senator Riegle. Not at this time, Mr. Chairman.

Senator D'Amato. Senator Sasser.

Senator Sasser. Thank you, Mr. Chairman.

PLANNING REORGANIZATION OF UMTA

Mr. Stanley, it has been brought to my attention that you may be planning a major reorganization of the Urban Mass Transit Administration. I was informed last week by representatives of major transportation authorities in Washington that there is a proposal pending that would split some functions from the Atlanta regional office and shift them to Philadelphia.

Now, from what I understand, this action would destroy good working relationships that have been built up over the years in the Atlanta regional office with at least the transportation authorities in my State.

I want to remind you that we have seen efforts in the past by the administration to downgrade or completely eliminate regional offices. Needless to say, I am very concerned that a major reorganization is about to take place in UMTA and Congress is not yet fully informed about it.

It is my understanding that Tennessee, Kentucky, North Carolina, and South Carolina will be immediately affected. It is my further understanding that the justifications given by your agency for this action is that the Atlanta region is overloaded and short on personnel.

My question is this: Why can't you simply add the necessary personnel that are needed to do the job in Atlanta? Why transfer the functions out of Atlanta to Philadelphia?

Philadelphia has very little in common with Tennessee, or Kentucky, or North Carolina, or South Carolina. Why move functions out of an office that is doing a good job to a place hundreds of miles further away that really has very little identification with this section of the country?

Mr. Stanley. Let me clarify. There is not a major reorganization underway within UMTA. We have looked at the possibility of consolidating resources in 2 of the 10 regional offices, those being Philadelphia and Atlanta.

We have experienced some personnel difficulties in the Atlanta regional office. There is no effort whatsoever to close the Atlanta office, and the Philadelphia office in terms of personnel is underworked, and we felt that some of the resources were common in terms of grants management, the ability to deal with small transit authorities in western Pennsylvania and other States, and could be consolidated with the Atlanta regional office.

I want to stress, Senator, that when the idea of consolidation, which has neither been approved by the Secretary nor OMB, occurred—our first step was to inform transit authorities that we were considering that but it hadn't been made as a final decision.

Our second step was—after we got their reaction was to contact the relevant congressional offices, and I would like to stress that there hasn't been a final decision made whatsoever, but it was an effort to match our resources consistent with our budget and personnel ceilings with the workload in 2 of the 10 regional offices.

Senator SASSER. Well, it occurs to me that if you have got a workload that is too heavy in Atlanta and one in which you don't have your personnel fully occupied in Philadelphia, you should transfer employees from Philadelphia to Atlanta or have a reduction in force in Philadelphia and add the RIF'd employees in Atlanta.

Mr. STANLEY. Those are two of the possibilities being considered, and I would like to stress and take the opportunity with your office or any other interested member of the delegation to outline just what we were considering.

Senator SASSER. I would like very much to take you up on that proposition, and I would like to get a rationale for the cost effectiveness of this action.

Quite frankly, it causes me some concern because we have seen these actions occur before in the administration, and on the surface they look innocuous but later on a hidden agenda appears, in which this is the first step toward closing regional offices. I have had that experience before with other agencies under this administration.

Initially, all kinds of assurances are given—well, no problem exists, or we have got a personnel problem here, or we could be more effective if some function of this regional office were done somewhere else.

Then before you know it they have stripped this office of its responsibilities, and then the next step is, well, we don't have enough work to keep these people going here in this regional office, so we are going to have a reduction in force, close this regional office and transfer some of the people to other locations.

So that is one reason for my apprehension about these proposed moves from Atlanta. I will look forward to hearing further from you about this.

Mr. STANLEY. Thank you.

Senator D'AMATO. Senator Mattingly.

Senator MATTINGLY. I don't have any questions or statements. I know in your written testimony you mentioned projects that are going to fall under this program are the ones that are subject to full funding contracts or that have a net project cost of over $100 million.

Do you anticipate looking at any projects below that amount?

Mr. STANLEY. We have, Senator, and basically our experience with that threshold, every project over $100 million, we would do. Based on a project of a lower dollar threshold and the experience of the transit authority, we would consider projects of a lower cost.

Most of those that fall between zero and $50 million are usually garage maintenace constructions that are done fairly routinely, and we haven't experienced problems. If we had a unique project below $100 million with a transit authority that had never done anything of that type or nature, we would certainly assign project management oversight to that level of project.

Senator MATTINGLY. You also mentioned, I believe, in your testimony that there would be instances in which all 10 tasks in a grantee's construction management plan would not be necessary.

I don't want you to go into all of this, but I would appreciate if you could respond in writing for the record in what ways this bill could provide UMTA with the flexibility it needs in a case like that.

Can you respond in writing?

Mr. STANLEY. OK.

[The following information was subsequently submitted for the record:]

In stating that in some instances not all 10 steps would be necessary, I was simply referring to the fact that some grantees already have well-established organizations and procedures for implementing construction projects, which would comply with some of the requirements of subsection (c) of the bill. Under these conditions we would not expect the grantee to prepare a completely "new" construction management plan, but simply to reaffirm that it would appropriately apply its existing organization, staff, procedures, and so on, to the specific project, and that it would make appropriate modifications to adopt the plan to specific projects, in order to meet the requirements of the bill.

Senator MATTINGLY. Thank you, Mr. Chairman.

NEW YORK 63RD STREET TUNNEL

Senator D'AMATO. I am going to ask a parochial question if I might. I have stayed away from discussing the 63rd Street Tunnel today, but I would like to know what is the status of this project. Has any decision been made with respect to the release of Federal funding and under what conditions would funding be resumed, if at all?

Mr. STANLEY. Right now, Senator, we are awaiting two reports from the New York City Transit Authority, one which will cover the structural aspects of the project under review. The other is the current state of the equipment that is in that tunnel.

Those reports are due, respectively, this May and July. I think once they are in we will be able to make some final decisions on the cost to open and operate the tunnel, which is critical. We are waiting to see what the New York Transit Authority's decision is, based on those.

Again, the difficulty is we do not have an estimate yet on what it would cost to bring the tunnel into operating condition, nor do we have an estimate on what the additional operating subsidy at the opening of that tunnel will require from the New York Transit Authority.

Senator D'AMATO. So the issue is actually twofold. One, what is the cost of making the repairs and completing the tunnel; and, second, what are the tunnel's operational costs?

Mr. STANLEY. I think that also is something Mr. Gunn will be looking at in terms of where we go from here once an accurate estimate on the cost of completing the project is done.

Senator D'AMATO. I would like to thank the panel. There will be a list of written questions that we would like to submit to you, particularly relating to the areas of how and when exemptions might be appropriate—the area that Senator Mattingly touched on—and some of the issues that Mr. Duscha raised, which I think are very important.

We can probably avoid a great deal of unnecessary costs by getting ahead of the problems before construction begins. Savings can be maximized at the early stages prior to the need for change orders, which can drive up tremendously the cost of these projects.

Let me thank you all for being here today.

Our second panel consists of our local transit officials: David Gunn, president of the New York City Transit Authority, who has Mr. Ascher with him; William Hellmann, secretary of transportation of the State of Maryland; Albert Martin, acting general manager of the Southeast Michigan Transportation Authority; and Joseph Fletcher, executive director of the Metro-Dade Transportation Administration.

Gentlemen, we appreciate your being with us. We ask you to confine your remarks to 5 minutes. We will put your testimony in the record in its entirety.

STATEMENT OF DAVID GUNN, PRESIDENT, NEW YORK CITY TRANSIT AUTHORITY, NEW YORK STATE METROPOLITAN TRANSPORTATION AUTHORITY, ACCOMPANIED BY MR. ASCHER

Mr. GUNN. Thank you, Senator. I would like to thank the committee for inviting us here this morning to testify. I am submitting for the chairman of the MTA his testimony—that is Robert Kiley—his testimony on S. 1931.

At any rate, I would like to second some of the comments made by my fellow general manager, transit head, Carmen Turner, that the New York City Transit Authority, and the MTA agree that the provisions to this bill are basic and necessary. We believe that the New York City Transit Authority at the present time has put in place changes which really comply with the intent of your legislation and that we would be able to comply with the legislation at the present time.

We feel that they represent a sound practical management approach to handling large capital projects.

I would like to make several comments or recommendations which have been alluded to or discussed in part by the previous panel. I think it is important that the details required in this legislation in terms of the specific plans be tailored to the size of the project.

In other words, in the New York City Transit Authority we have hundreds of projects underway, ranging in value from less than $1 million to over $100 million, and obviously the level of detail in terms of project specific planning which we want to supply should be tailored to the project and the experience that UMTA has with the agency, in this case with the transit authority.

TIME LIMITS TO AVOIDS DELAYS

I also think it is important that the approval process for our plans has some time limit on it so that we don't get into a situation where we spend months, and months, and months waiting for a response on the plans that we submit.

I would also—make a detailed comment, but I think it is a relevant one. In the legislation it talks about a project schedule approved by the transit authority and the prime contractor. I think it is important to keep the heat, if you will, on the transit authority, which is the responsible constructing agency for the schedule, and that the contractor should furnish a schedule to the transit authority. It is the transit authority's responsibility to develop a good, solid construction schedule.

The last point that I would like to make echoes a thought that Carmen Turner expressed, and that is that we be careful that we limit the amount of overhead we build up on oversight functions so that it is realistic in light of the size of the program, we don't end up spending more on oversight than on actual construction.

Other than those comments, we think the legislation is laudatory, and we have been moving on our own to try to get ourselves in a position of compliance.

[The complete prepared statement follows:]

TESTIMONY GIVEN BY ROBERT R. KILEY
CHAIRMAN OF THE METROPOLITAN TRANSPORTATION AUTHORITY
BEFORE THE UNITED STATES SENATE COMMITTEE
ON BANKING, HOUSING AND URBAN AFFAIRS

To Be Presented By:
David L. Gunn
President, New York City Transit Authority

Washington, D.C.
April 9, 1986

My name is Robert Kiley and I am Chairman of the Metropolitan Transportation Authority (MTA). I would like to thank Senator D'Amato and the other members of the Committee on Banking, Housing and Urban Affairs for providing me an opportunity to comment on proposed legislation requiring construction management oversight on UMTA - funded capital projects.

For those of you unfamiliar with the MTA, MTA is a State-chartered, public benefit corporation encharged with the responsibility of providing public transportation services in New York City and seven suburban counties. MTA passengers account for one of every three users of mass transit nationwide. MTA has a 1986 operating budget of $4.1 billion and a capital budget of $1.5 billion. Approximately 30% of MTA's capital budget is federally funded.

There can be no disagreement that sound management of UMTA capital dollars is an absolute necessity, not just for individual transit properties like MTA, but for the entire mass transit industry. For without it, there can be no assurance for the public and its elected representatives that scarce Federal transit dollars are being spent prudently. Ultimately, the absence of capable project management will erode public support for mass transit and undermine the national mass transit program ---- an outcome, I am certain, we all want to avoid.

The goal of S.1931 is laudatory and is fully supported by MTA. S.1931 mandates construction management plans for UMTA-funded capital projects. The bill contains provisions that are basic and necessary ingredients to any good project management plan. These provisions include minimum requirements for controlling a project's cost and schedule and procedures for assuring a project's quality. The bill also contains reporting requirements to keep management current on the progress of a project and in a position to take corrective action if necessary. I would like to add that I am encouraged to see that the project management plan outlined in the bill resembles the management approach already instituted at MTA's largest operating authority, the New York City Transit Authority. If the USDOT or UMTA were to require a project management plan in accordance with the provisions of S.1931, the Transit Authority as well as MTA's other operating authorities would be able to fully comply.

With this said, I would like to raise several points where the proposed legislation would benefit from further clarification. I also would like to offer some recommendations for the Committee's consideration.

First, S.1931 authorizes the USDOT Secretary to use funds to contract directly for the performance of construction management oversight. As presently drafted, the amount of funds available for oversight is left to the determination of the Secretary. I am sure I speak for other transit properties when I say that we as recipients of Federal funds would prefer that the amount available to the Secretary be specified and that this figure reflect a sensitivity to recent reductions in Federal assistance to mass transit. I am sure the Committee can understand MTA's desire to see as much Federal assistance as possible made available for projects.

Second, the bill requires recipients of Federal capital assistance to provide the contractor(s) selected by USDOT with access to construction sites and project records as may be reasonably required. While this requirement is manageable, language should be added to the bill to make it clear that USDOT - selected consultants do not have authority over a transit property's contractors. This clarifying language is needed to preserve the contractual relationship between a property and its consultants and to prevent a third party from interfering in this relationship.

Third, S.1931 is unclear as to the precise obligation of the recipient of Federal capital funds. The bill states that, as a condition of Federal assistance for a major capital project, the Secretary shall require a recipient to prepare and, upon approval, implement a construction management plan which, at a minimum, consists of the provisions set forth in the bill. The bill is unclear whether the recipient transit authority is obligated to issue a construction management plan for each federally funded capital project or whether a recipient can comply with the law by submitting an authority-wide construction management plan. Clearly, given the size of MTA's capital budget and the significant role played by the Federal government in this budget, it would be in MTA's interest to be able to fulfill its legal obligation by submitting an authority-wide plan or, as an alternative, a mix of individual plans covering several large projects and a broader plan for the remaining work.

Fourth, if the intent of the bill is to have the recipient of Federal funds establish a project-specific construction management plan, than the Committee might want to consider establishing a specific dollar amount to serve as a limit or floor to delineate which projects are subject to the legislation and which are not. With the large number of federally funded projects (several hundred at MTA alone), setting such a limit, in my opinion, would make the implementation of the bill more manageable both for USDOT and UMTA as well as its grantees. For this purpose, I propose a figure of $100 million: capital projects at or above this level would be subject to the legislation, projects below would not.

Fifth, S.1931 does not require the USDOT Secretary to approve a recipient authority's construction management plan within a specified time period. Inserting appropriate language into the bill would obligate the Secretary to act expeditiously and would prevent the requirement of a construction management plan from becoming a device to withhold funds from otherwise qualified projects.

Sixth, Section 2(c) of the bill sets forth the minimum requirements for an acceptable construction management plan. The third requirement listed is a "comprehensive schedule approved by both recipient and prime contractor on the project." I suggest that the Committee consider removing the "prime contractor" from this provision, for it is the recipient, not the contractor, that has the obligation to UMTA to complete a project on time and within budget.

Finally, I would like to close my remarks with a general comment. Adding another layer of oversight, as

proposed by S.1931, does not, in and of itself, assure the quality of a project, particularly one that already has the benefit of oversight by Federal, State and local government agencies. The introduction of another layer of oversight might only distract senior personnel from executing the management functions that are appropriately theirs and for which they are held strictly accountable.

The most efficient and effective method of achieving desired levels of quality is by "building" quality into the project through procedures and supervision. Building strong management, developing sensible procedures, establishing strict accountability -- this is what we are doing at the New York City Transit Authority and at our other operating authorities. This is, in my view, how Federal dollars can be best spent and this is certainly our goal at MTA.

Thank you.

Senator D'Amato. Thank you very much.

Mr. Martin, I am pleased to see the Senator from Michigan here today. Maybe he has a comment to make to you.

Senator Riegle. Thank you. I am especially pleased that Albert Martin is able to join us today. He is not only the acting general manager of the Southeast Michigan Transportation Association but also a person who has extensive experience in private industry and public transportation.

Mr. Chairman, I would also like to use this occasion to say that I appreciate the effort you are making in this hearing today. I think it is clearly important that we find ways to tighten and improve the management of these one-of-a-kind projects, particularly now that the dollars available for transit activity are going down. That makes it all the more difficult for us. I want to work with you in refining the legislation that you and others have drafted.

I see some aspects of the bill that ought to be slightly different, but I think our general desire is in the same direction. I look forward to working with you on it.

Senator D'Amato. Senator Dodd.

STATEMENT OF SENATOR DODD

Senator Dodd. Mr. Chairman, I would just commend you for not only the bill but the hearings, and I am honored to be a cosponsor of this.

My good friend from Michigan has just said that there may be specifics in the legislation that we would want to change or others would. I think all of us feel that there is nothing etched in marble in this, but I think it is self-evident, obviously, of the incredible waste we have seen, countless projects.

You have cited the ones in your home State, and all of us can point to ones across the country where tremendous savings could have accrued to the public and would be far better served if we had had this kind of legislation.

It would enjoy broad base support, and it is very helpful.

Senator D'Amato. Let me thank both Senators, and Senator Dodd in particular, for being a cosponsor of S. 1931. At this point I think that we recognize that there is nothing etched in stone. Of course, this legislation can be amended to address only relevant concerns.

What we are attempting to do is provide the ability to monitor major capital projects in such a way as to avoid the kind of cost overruns and construction delays that have really been wasteful of precious resources. In today's fiscal climate that becomes even more important. We need to address transit's signficant capital needs and also assure that construction funds are well spent.

We look forward to looking with you and your staffs in assuring that we can come as close to those goals as humanly possible.

I thank my colleagues.

Mr. Martin.

STATEMENT OF ALBERT MARTIN, ACTING GENERAL MANAGER, SOUTHEAST MICHIGAN TRANSPORTATION AUTHORITY

Mr. MARTIN. Mr. Chairman, Senator Riegle, Senator Dodd, let me take this opportunity to thank you for inviting us to participate in this very important legislative process.

I have submitted testimony that details the project in Detroit, and it gives some specifics concerning the problems of construction and finances that we have experienced.

This morning I will confine my comments to just a summary that is also contained in that testimony of the bill that is proposed.

Let me begin by saying that we agree with the concept of S. 1931. It is good. But there are a few amendments that I would like to suggest.

OVERSIGHT INFORMATION SHARING

The construction management oversight firm, although hired and responsible to UMTA, should be required by law to share all information it gathers with the grant recipient at the same time it provides that information to UMTA.

If construction problems are occurring on a project, the grant recipient should be told immediately.

If this arrangement is not deemed proper, then I would suggest providing the transit authority with its own independent construction management oversight. This firm would provide the same services to the transit authority as the Federal firm, the UMTA firm, would be providing to UMTA.

However, the existence of two separate oversight firms raises questions of coordination of effort, and this will have to be resolved by the establishment of a joint oversight office manned by separate and independent engineering consultants. That, of course, as we see, could be seen as more bureaucracy.

Second, the construction management and oversight firm should be required to assist the grant recipient in solving problems. SEMTA, which is prohibited from using current firms—that is, the oversight firm on the Detroit people mover—would better be served if we had direct input as problems are identified and solutions solving these problems. This I think is something that is necessary.

I would like to conclude my remarks today with some suggestions for changes that probably could be made in the area of the Mass Transportation Act of 1964, that would, if they had been in place, have definitely saved us some problems.

First, UMTA should be expressly prohibited by law from funding any cost reimbursable contract. If UMTA feels an exception should be made for some particular project, it should go back to Congress and ask for permission to grant such an exception.

Second, UMTA should be expressly prohibited from authorizing construction to begin before at least 40 percent of the engineering on such a project has been completed. This was not the case with SEMTA.

Third, UMTA should be prohibited from using new Federal moneys to pay for cost overruns. New Federal money is not used for this purpose in Detroit, and that is how it should be in other cities as well.

Had the first two prohibitions been in effect in 1983, when we started our project, the project would not have experienced some of the cost overruns that we did. Had the third prohibition been in effect, stated clearly in the law, a year of confusion and wrangling could have been avoided.

Once again I want to thank you for extending the invitation to participate in today's activities. I hope these comments have been helpful, and of course I remain available to be of any assistance in the future as you so desire.

[The complete prepared statement follows:]

ALBERT MARTIN
TESTIMONY BEFORE
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE
APRIL 9, 1986

Good morning, and thank you for the opportunity to participate in the making of the important legislation you have before you. It is truly an honor.

I will begin by describing Detroit's Downtown People Mover, and the problems associated with its financing and construction. I will then attempt to retrospectively apply Senate Bill 1931 to our experience, and I will conclude with what I hope will be helpful suggestions for the improvement of both the proposed legislation, and of existing law.

The Downtown People Mover is an elevated, closed loop, automated transit system 2.9 miles in length. It connects all major activity centers in Detroit's Central Business District, existing and planned. It is intended to permit pedestrians to move quickly from place to place, in comfort in all kinds of weather. For example, conventioneers will be able to travel from hotels to convention sites to entertainment centers without going outdoors.

The system will feature 13 vehicles capable of carrying 100 passengers each and of travelling the entire route in approximately 15 minutes, including time for stops at 12 stations.

The financing history of this project is long and complex, so I will try to give just a brief summary.

In 1976, SEMTA proposed a smaller DPM with an estimated cost in 1976 dollars of $56 million. The Urban Mass Transportation Administration would not provide 80 percent federal funding for the project, but suggested we apply for 100 percent funding under the then still-existing DPM Demonstration Program. Ultimately, Detroit was selected under the Demonstration Program but, shortly thereafter, the rules changed and we were only eligible for 80 percent federal funding. Currently the federal share of the total project cost is less than 80 percent.

The original cost estimate of the present larger project, was $137.5 million. However, I should mention several factors which made that estimate exceedingly loose.

1. In accordance with UMTA guidelines, the estimate was made without knowledge of the technology to be used.

2. The estimate was based on grossly insufficient preliminary engineering. For example, there was not enough engineering to discover that part of the route was over soil so poor it would not support the structure as planned.

3. The estimate was two and a half years stale by the time construction began and, therefore, it did not take into account inflation or the major route changes which new and planned downtown development had made necessary.

All the evidence I have examined indicates that SEMTA management of that time, and UMTA management, were fully aware of the unreliability of the estimate they were using. Nevertheless, in September of 1982, UMTA and SEMTA signed a Full Funding Contract providing $100 million of federal money, to be matched by $27.5 million of state funds, and declared the total of $137.5 million to be sufficient for the task at hand. Had an accurate estimate been attempted, it would have been closer to $200 million and the vast majority of what are now called overruns would not have occured.

Construction of this approximately $200 million project began in November of 1983 although it was still publicly referred to as a $137.5 million project. Soon thereafter, the SEMTA Board of Directors began to learn some of the true costs. Subsequently, in late May of 1984, I was appointed acting general manager; within six months, all of the SEMTA management personnel originally associated with the DPM were gone.

My chief financial responsibilities were two-fold:

1. Identify and control costs, and keep them controlled by replacing the cost-reimbursable contract with a fixed-price contract.

2. Secure the approximately $72.5 million necessary to complete the project.

I was able to complete the first task when the prime contractor, Urban Transportation Development Corporation (UTDC) signed a fixed price contract for $166 million on June 5, 1985.

The second task proved more difficult. By March 26, the SEMTA Board of Directors had reprogrammed $47 million of capital funds into the DPM. This insured that no new federal funds would be needed. Commitments from the state and the city were also obtained for the remaining amount necessary, although some of these commitments still required final approval by the appropriate persons.

Then, on June 27, the rules changed again. UMTA insisted that the Mayor of Detroit and Governor of Michigan sign a document called a

Memorandum of Understanding. This document forced all parties to rethink their earlier commitments.

Consequently, it was agreed that a new government corporation - the Detroit Transportation Corporation - should be formed to own and manage the project. The SEMTA Board of Directors, which had held fast to its funding commitment, agreed to transfer the reprogrammed funds to the new corporation. The city and state also made formal financial commitments to the project, and the full amount necessary to complete the project then became available.

On October 4, 1985, SEMTA transferred ownership of the project, along with its portion of the funding and all other DPM assets, to the DTC.

I would like to conclude this summary of the financial problems of the People Mover with these points:

1. Costs were identified, controlled, and firmly fixed.
2. The cost problem was solved without new federal money.

Turning now to construction, I will again ask for your understanding as I briefly summarize very complex engineering problems.

There have been two major construction difficulties with the DPM, both having to do with the guideway beams. I should point out that the 2.9 mile elevated guideway is supported on 183 poured-in-place concrete columns. The guideway itself consists of pre-cast concrete beams, each of which is 6 feet 4 inches high by 9 feet, 10 inches wide. The weight is approximately 2,300 pounds per linear foot. The length of each beam varies, but a typical beam is approximately 100 feet long and more than 100 tons in weight.

Fabrication of these beams took place in a special factory about one mile from the DPM route. Completed beams were stored in the plant yard and trucked to the site as needed.

Beam manufacture involved building wooden forms, inserting steel reinforcing rod and post-tension ducts into the forms, and filling the forms with concrete. All of this was to be done according to extremely detailed specifications written into the appropriate contracts.

In June of 1984, shortly after I assumed the general manager's position, I learned that the contract specifications had not been followed regarding at least one of the beams. I ordered a complete investigation. The investigation determined that 128 of the beams did not have sufficient concrete cover over some sections of the reinforcing rod. In other words, part of the steel was not fully protected against the long term corrosive effects of water, salt and air pollution. Over a period of years, it was feared, the steel would rust and corrode and need expensive maintenance.

Consequently, I ordered the general contractor to destroy 31 beams, including 16 which had already been erected, and replace these with beams which fully conformed to contract specifications. This was done. I also ordered the contractor to treat the remaining beams with an epoxy protective coating, and to agree to a maintenance plan which would insure at least a 50 year life for the entire guideway. Details of this plan still had not been worked out at the time the project was transferred to the DTC.

All costs of the beam replacement were borne by the general contractor.

The second beam problem arose in June of 1985, as sections of the nearly completed guideway were being post-tensioned. Post-tensioning involves running steel cable lengthwise through the post-tensioning ducts inside the beam, and then tightening the cable.

Post-tensioning put the beams under enormous stress, and one of them cracked. Again, a stop work order was issued and an investigation begun.

Our engineers, aided by consulting engineers, suspected that some of the beams had been improperly designed, a suspicion which was shared by the general contractor and its investigating engineers.

The problem was not resolved by the time the project was transferred to DTC, and SEMTA has not had engineering involvement with the problem or its solution since October 4. I can tell you, however, that the general contractor announced a solution on December 20, 1985. Basically, UTDC said 14 beams would be replaced with new ones of a different design, and 54 additional beams would be strengthened.

UTDC also said that, under terms of the fixed price contract it had signed with SEMTA and which had subsequently been assigned to the DTC along with all other assets of the project, it had no choice but to again absorb all costs.

I would like to complete this summary of the major DPM
truction problems with this statement: The problems were the
onsibility of the general contractor and, therefore, no taxpayer
y was involved.

Now I will attempt to apply Senate Bill 1931 retroactively to the
lems I have just described. Let me begin by stating my firm
itment to the principle of construction management oversight.
me also say that I believe any law enacting this principle should
o in as much detail as possible. Clear, unambiguous federal law,
subject to interpretation or misinterpretation by federal
cials, or to over zealous application or under zealous application
ederal officials, with exactly the same force and effect in Miami
n Detroit and elsewhere, is needed.

Guidelines, even those written with no thought of political or
aucractic gamesmanship, always erode the law-making authority of
ress. Guidelines always create a system outside the law. No
er how hard we try, the majesty of the law cannot be transferred
uidelines. A guideline is always subject to discretionary power.

Therefore, I strongly urge this Committee to itself write most of
guidelines referred to in subsection d and incorporate them into the
For those few remaining areas which clearly cannot be
slated, I urge that Congress give the Department of Transportation
firm instructions on what should be included in, or excluded
, those guidelines it must write.

Returning to the subject at hand, let us assume that Senate Bill

1931 had become law in the 1970's, and that it had spawned an excellent set of guidelines which were not changed at any time, and which were fairly, uniformly, and consistently applied to all major capital projects undertaken with federal funding assistance, including the Detroit DPM.

Would the law have helped SEMTA avoid its DPM problems? Regarding the financial problems, I think the answer is clearly no. This law would not prohibit a grant recipient from announcing a $200 million project as a $137.5 million project, and that is essentially what happened in Detroit. Nor would it have prevented the insufficient preliminary engineering which contributed so much to the low cost estimate. It would also not have prevented the two and one half year delay which helped make the original estimate unrealistic.

Would the law have helped SEMTA avoid its DPM construction problems? Here I think the answer is a qualified maybe.

The Detroit DPM project has had a construction management firm from the beginning. Engineers from this firm were at the beam fabrication plant during the manufacturing process. These engineers did discover the manufacturing problem, but only after 128 of the 173 beams had been incorrectly cast.

Perhaps those engineers would have been more diligent had they been operating under this law. Laws and guidelines can mandate diligence, although they can't make it happen.

By the time the second major construction problem was discovered, the first construction management firm had been joined by a second npany, which was hired by the UMTA Administrator in January of 1985. s oversight firm did not discover the problem until the beams arted cracking. I don't think this firm is to be blamed for not tching the problem earlier, since the design flaw - if indeed that the cause - apparently cannot be seen in the engineering drawings formulas.

The construction management oversight firm proposed in Senate Bill 31 could have been helped with the Detroit DPM, provided these anges were part of the law:

1. The construction management oversight firm, although hired and responsible to UMTA, should be required to submit copies of all ports to the grant recipient at the same time as the originals are nt to UMTA. If mistakes are being made on a project, the recipient ould be told immediately so they can be corrected.

If this arrangement is not deemed proper, then I would suggest oviding the transit authority with its own, independent construction nagement oversight. This firm would provide the same services to e transit authority as the federal firm would provide to the federal vernment.

However, the existence of two separate oversight firms raises estions of coordination of effort, and this would have to be solved by the establishment of a joint oversight office, manned by parate and independent engineering consultants.

2. The construction management oversight firm should be quired to assist the grant recipient in solving construction

Senator D'AMATO. Thank you very much, Mr. Martin.

Mr. Hellmann.

STATEMENT OF WILLIAM K. HELLMANN, SECRETARY OF TRANSPORTATION, STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION

Mr. HELLMANN. Thank you very much, Mr. Chairman.

Let me say that the Maryland Department of Transportation strongly supports the concept of the legislation you are proposing. We believe that management during both design and construction is key to a successful project.

At the same time, we believe that there is no single approach that guarantees that success.

DIFFERENT APPROACHES TO JOBS

What I would like to do is cite three examples in Maryland that each have been handled differently.

Section A of our rail transit program is 6 miles long, was built over a 9-year period and finished within 5 percent of the originally established budget. That project was handled by our MTA people, a private firm, with limited Federal oversight.

Our second metro section is another 6 miles in length and will be finished on time and under budget. It is about a $200 million project. It will be finished about $20 million under budget. This particular project was handled totally in-house without private outside help from engineering firms and with limited oversight by the Federal Government.

The third project is the I-95 Fort McHenry Tunnel, an $825 million highway project in Baltimore. We finished about $75 million under budget—$750 million and on schedule.

This project was handled even differently. It involved considerable oversight by the Federal Highway Administration along with outside help, private engineering firms and the city and State staff.

So what it really comes down to, in our opinion, is this: Strong management at the local level is the key to a successful project, strong involvement in the early design phases all the way through to completion of construction.

As far as the legislation, we again raise three issues that I think have been previously raised that we would recommend be considered concerning the bill.

The first is to permit some form of certification for States or local authorities that have demonstrated that they do have a strong construction management program and do have their house in order, so to speak.

Second, that there be timely review by UMTA, which you have already covered.

And finally, that the law be applied to appropriate projects; that is, projects of significant size and not to the smaller projects.

Again, Mr. Chairman, thank you for the opportunity to appear. We are pleased to support the legislation in concept.

[The complete prepared statement follows:]

Senator D'AMATO. Thank you, Mr. Hellmann.

Mr. Fletcher.

STATEMENT OF JOSEPH FLETCHER, EXECUTIVE DIRECTOR, METRO-DADE TRANSPORTATION ADMINISTRATION [MIAMI METRO-RAIL]

Mr. FLETCHER. It gives me great pleasure to appear before the subcommittee to testify on bill S. 1931, which will require construction management oversight on major capital projects.

Let me categorically state at this point that I am in complete support of S. 1931.

As the executive director of the Metropolitan Dade County Transportation Administration, one of my responsibilities entails all engineering and construction activities related to the implementation of new transportation systems as well as extensions or modifications to existing ones.

As some of you are aware, the construction of Metro-Rail has received some unfavorable attention, and certain allegations about shoddy construction were made. As a result, the Urban Mass Transportation Administration selected and contracted directly with the firm of Morrison Knudsen to perform construction management oversight.

At the same time Metropolitan Dade County immediately established stringent quality control, quality assurance functions, procedures and responsibilities, and initiated a comprehensive reorganization, design analysis, as-built specifications, and inspections, testing repairs, long-term maintenance, and monitoring programs that rank, in my opinion, as perhaps something that has never been attempted before in the Nation.

I also believe that it stands as a program that can be used as a model and something that we are very proud of.

BENEFITS OF CONSTRUCTION MANAGEMENT OVERSIGHT

The benefits of a construction management oversight contractor, in my opinion, are twofold:

First, it provides the Federal Government with an independent check on the status of construction activities being performed by each recipient of Federal assistance as well as assurance that the recipient's construction management plan is being fully implemented.

Second, it brings into the project additional experienced manpower who can be a great asset to the recipient in the daily resolution of design and construction problems.

The latter requires, however, a good rapport between the recipient and the oversight contractor. While maintaining proper contractual relationships, it is essential that the recipient perceive the oversight contractor as a member of the team with the common goal of constructing the project as designed, on time and within budget, and not as an unnecessary evil whose main function is to find defects, errors, et cetera, et cetera, real or nonexistent, with the sole purpose of justifying their existence or obtaining a financial gain.

In Miami, I believe we were extremely successful in working with our oversight contractor as a team. I cannot emphasize enough the importance of this item to the success of the program.

I also totally endorse requiring the recipient to prepare and implement a construction management plan. Major emphasis should be placed on property acquisition, which usually controls the critical path of the project and amounts to a large portion of the project budget.

Consultants' budgets and fees must be properly controlled, and they must be required to submit designs that reflect approved construction budgets.

Constructability issues must be fully addressed during the design phase. Again, a top-notch and experienced oversight contractor can be of tremendous help to a recipient in this area if the proper teamwork is achieved.

It is also essential that construction schedules not only be prepared for all aspects of construction, but that they also be continuously updated to control the progress of the work and also allow the recipients to effectively handle delay claims from contractors.

Last, our efforts in the area of establishing quality control, quality assurance programs for construction activities have been fully documented and can be shared with future recipients of Federal assistance on major capital projects.

Once again let me state in closing that I strongly support amending the Urban Mass Transportation Act of 1964, requiring construction management oversight on major capital projects.

[The complete prepared statement follows:]

problems. SEMTA is currently prohibited from using the services of the firm now monitoring the DPM for the federal government, even though that firm is in an excellent position to help.

I believe these two amendments to the law would be helpful and should be made.

I would like to conclude my remarks with some suggestions on changes in other sections of the Urban Mass Transportation Act of 1984 that would definitely have made a difference in the Detroit DPM project.

First, UMTA should be expressly prohibited from funding any cost reimbursable contract. If UMTA feels an exception should be made to that rule for some particular project, it should go back to Congress and ask for a specific exception.

Second, UMTA should be expressly prohibited by law from authorizing construction to start on any project which has not completed at least 40 percent of the necessary preliminary engineering.

Third, UMTA should be expressly prohibited by law from using new federal money to pay for cost overruns. Detroit, of course, did not use any new federal money for this purpose, but our citizens are not at all convinced that other cities have not been able to, or will not be able to, use federal tax dollars for that purpose. The widespread feeling that some cities are favored by administrative discretion while others are punished corrodes the democratic process. We should return to being a nation of law, not of persons.

Had the first two prohibitions been in effect in 1983, the Detroit DPM project would not have experienced most of its funding difficulties. Had the third prohibition been in effect, the local funding solution we put in place last October would probably have been used a full year earlier.

I want to again thank you for extending me the honor of participating directly in the legislative process. I hope my comments have been helpful, and I stand ready to cooperate further should the Senate so desire.

Thank you.

Maryland Department of Transportation
The Secretary's Office

Harry Hughes
Governor

William K. Hellmann
Secretary

TESTIMONY BY WILLIAM K. HELLMANN, SECRETARY OF THE MARYLAND DEPARTMENT OF TRANSPORTATION BEFORE THE UNITED STATES SENATE COMMITTEE ON BANKING, HOUSING AND URBAN AFFAIRS ON S. 1931 PERTAINING TO CONSTRUCTION MANAGEMENT OVERSIGHT

Room SD-538, Dirksen Senate Office Building
Wednesday, April 9, 1986
9:30 A. M.

My name is William K. Hellmann, and I am Secretary of the Maryland Department of Transportation. I am responsible for the development and operation of a consolidated Department of Transportation with six administrations, including aviation, port, rail, motor vehicle, highway, and transit.

Our Mass Transit Administration operates bus and rapid transit services in the Baltimore region as well as providing assistance to small transit systems around the state. The first eight miles of our Metro line opened in 1983. Six more miles are in construction, scheduled to open next year while an additional one-and-one-half mile segment is in engineering. We are also designing and constructing several bus facility projects including our first completely new bus garage in more than 40 years.

I serve also as the Chairman of the Maryland Transportation Authority, which operates the seven bridge, highway and tunnel toll facilities in the state, including the Fort McHenry Tunnel. The Fort McHenry Tunnel is the world's largest submerged toll tunnel designed specifically for vehicular traffic, and it opened on November 23, 1985.

I would like to thank you for the opportunity to testify on S. 1931, which would require construction management oversight on major UMTA-funded projects. I have brought with me Ronald J. Hartman, the Mass Transit Administrator, and Kenneth D. Merrill, who was the Project Manager for the Fort McHenry Tunnel, working for the Interstate Division for Baltimore City. We are ready to answer any questions which the Committee may have regarding Maryland's track record in completing major capital transportation projects on schedule and at or below budget.

In Maryland, we firmly believe in strong project management which includes effective construction management. That approach has served us extremely well, leading directly to the successes of the Baltimore Metro and the Fort McHenry Tunnel.

First, I would like to talk about our transit experience. The eight-mile line which is operating today was completed for just over 5% above project budget established nine years earlier. And, the bulk of construction took place during the high inflation years of the late 1970's and early 1980's. Moreover, our system has had few operating problems.

Our six-mile extension will open next year, coming in at least $20 million under the budget set in 1979.

Our success is due to several factors including careful project definition, realistic budgeting, a sufficient period for careful design, and strong management and control of projects through the construction and start-up phase, within our fiscal limits.

As the owner of these projects, we must operate and maintain them for many years to come. It is clearly in our best interest to ensure that high-quality, defect-free, safe and operable facilities and systems are built and procured. In addition, to get the most out of our federal allocations, as well as the local match which is a very significant amount of funds to the State of Maryland, we design and manage projects for economical results.

So, we fully understand the purposes you are seeking to achieve with this legislation. The emphasis on sound construction management principles and the individual elements the bill identifies have always been present in our transit development programs and they do result in quality projects with a judicious use of financial resources from all levels of govern= ment.

In spite of its size and complexity, the Fort McHenry Tunnel also was planned, designed and constructed with efficiency and minimum cost. The five-and-one-half year project was completed on schedule and under budget -- early estimated construction costs were $825 million, and the project was completed for $750 million -- a $75 million saving, even though the early part of the construction occurred during a period of high inflation. The Fort McHenry Tunnel, which represents the final link of I-95 on the east coast, was designed by SPB, a joint venture of Sverdrup & Parcel and Associates, Inc. and Parsons Brinckeroff Quade & Douglas, Inc. under the direction of the Interstate Division for Baltimore City with the full cooperation of the Federal Highway Administration.

The challenges of building an eight-lane tunnel nearly two miles long were immense. Rigorous planning -- including 25 separate exhaustive design reports -- resolved many of the anticipated problems and resulted in savings of time and money.

Project management and monitoring was a team effort. The Interstate Division for Baltimore City (IDBC), comprising both City and State employees had overall responsibility for the project. There was a construction management agreement with the design consultant, who supplied key management personnel throughout the life of the project. There was also an inspection agreement, for which the same consultant was eventually selected.

The project manager, a City employee of IDBC, was in charge of the consultant management staff. The consultant inspection forces were supervised by a State employee of IDBC, and were supplemented by other State and City employees. A representative from the Maryland Toll Facilities Administration (now the Maryland Transportation Authority) was also on the team. The Federal Highway Administration, through its District Office in Baltimore, had a full time representative on the job, who could expedite approvals, change orders and interpret federal procedures as they affected the project.

The construction of the Fort McHenry Tunnel required the precise coordination of 11 prime contracts. Each contractor was required to prepare a computerized CPM schedule for his contract, and also to update the schedule monthly based on the progress toward project completion. The management staff coordinated the eleven CPM schedules into the overall project schedule. This was updated at least on a quarterly basis. When problems were encountered, the project manager was able to negotiate with the contractor rather than experience claims and/or delays in the schedule. In addition to the CPM monitoring, a special wage stabilization agreement between the Interstate Division for Baltimore City and affiliated Local Unions of the Baltimore Building and Construction Trades Council was instrumental in keeping the project on schedule.

There were a number of unique aspects to the project, such as the extensive use of value engineering and the escalation clauses for specific materials which helped to keep the project under budget. The materials covered by the escalation clauses included structural steel, cement, reinforcing steel, fuel and asphalt materials.

The dedication of everyone involved at each level -- city, state, federal -- is a monumental example of intergovernmental communication and cooperation

The success of the Fort McHenry Tunnel project can be attributed largely to the careful planning and design work which took into account the many factors which needed attention and the constant monitoring by staff and federal representatives and consultants who were on-site and who understood the unique problems to be addressed.

The key ingredient in both the transit and the tunnel project is strong design and construction management and surveillance.

Strong management, rather than the presence of federal monitoring, seems to be the key to project success. The two Maryland examples -- one with and one without federal monitoring -- both achieved their objectives, suggesting that federal oversight is not always the critical element in a successful project. If it is determined that a greater degree of federal oversight is appropriate for some projects, then it should be carefully targeted, commensurate with UMTA's available resources.

To further emphasize the need to place resources where they are needed, I want to talk about the Maryland experience with the Federal Highway Administration and show how helpful a federal process can be. The Fort McHenry Tunnel project benefitted from a locally based and well staffed team. Whereas the Federal Highway Administration participated in the decision-making and approvals process for the tunnel, its role was not that of an outside reviewer, whose function would have caused additional unnecessary recordkeeping or justifications. Rather, it served to assure quality, and bring federal resources to assist in the development process.

In summary, I am concerned that additional requirements for all major transit projects could increase the cost and unduly lengthen the design and construction period. Therefore, I would suggest some additional features that might be included in the legislation, for your consideration.

1. Provision for a self-certification process by which grantees with good track records and other supporting evidence could certify that a sound construction management structure is in place. UMTA's concurrence would obviate the need to resort to all of the bill's requirements for the particular grantee, saving the cost of the federal construction management consultant as well as excessive documentation.

2. Imposition of time limits upon UMTA's review of the construction management plan. A 30-45 day period is appropriate.

3. Definition of "major capital project" to assure that only large investment construction projects are included rather than such items as smaller bus garages or even the purchase of replacement buses.

We wholeheartedly recognize the value of sound project management and construction management and we believe the Baltimore Metro and other Maryland DOT improvements serve as persuasive testimony. We are asking, however, that legislation consider the grantee's internal skills in these areas and that safeguards be included to ensure that added costs or time delays do not inadvertently subvert S. 1931's strides towards the accountability, efficiency, and effectiveness of these public projects.

Senator D'Amato. Thank you very much.

Senator Riegle, do you have any questions?

Senator Riegle. Let me say again that I appreciate the testimony of the panelists. I wonder if there's any further elaboration you might want to make at this point, in response to comments that others made at the table.

RECOGNIZE THE VALUE OF THE OVERSIGHT CONCEPT

Mr. Martin. Senator, I would only just echo the comments that my colleagues made. I think that it is essential that we recognize that this is a concept that we are all using with our respective projects. We may not have done so initially when the projects began, but we recognized the need for it, and it is now in place. UMTA has provided assistance with that as well. We think it's just a matter now of fine tuning that concept. Make sure that it is in place for the betterment of the project and the completion of the project.

Senator Riegle. I think this would be an appropriate time for you to give us a concise summary of where the people mover stands at this point. How does the situation look, and what do you foresee?

Mr. Martin. The people mover, right at this point, I think, stands on very firm ground. The project has been turned over to the city of Detroit, a newly created Detroit Transportation Corp. [DTC], SEMTA is the grant recipient. The DTC is the subrecipient. Work is progressing with a scheduled completion date for approximately 1 year from now for the demonstration period.

Senator Riegle. Is everything on schedule at the moment—construction, manufacture of the cars, installation of the equipment, and so forth?

Mr. Martin. Yes, Senator, it is. The schedule is being met.

Senator Riegle. Are the actual and projected costs at this point within the estimates that have been made, or is there a likelihood of overruns?

Mr. Martin. The total indicated cost to complete in December of 1984, is identified as $200 million. That is still the cost to complete the project. No additional costs have occurred.

Senator Riegle. Thank you.

Senator D'Amato. I'm going to thank the panel and ask them to submit to us any additional suggestions they might have with respect to the legislation. I understand Mr. Hellmann's request that those areas with prudent track records of accomplishment be exempted, but I have really one question I'd like to ask you, because Mr. Hellmann, when we look at the Maryland projects, they're really examples of tremendous efficiency. As we look at your tunnel project, the cost estimate was $825 million for the Fort McHenry Tunnel. Lo and behold, it was completed for $750 million. That is absolutely magnificent. It certainly flies in the face of most Federal and municipal projects, where we are lucky if we only experience a doubling of the original cost estimate. If we get away with that much extra expense and we complete the project and it operates, that, with our history is almost efficient. So I can see where you might say, well, look, we've had a pretty good track record here, and now to have us undergo this review process with somebody up there reviewing project management is not fair. Let me ask you, since you evidently have all of the essentials in place then, would review by a PMO firm act as an impediment to advancing your project?

You don't see it acting as an impediment, do you?

Mr. HELLMANN. We do not, Mr. Chairman. That's exactly right. We are doing all those items anyhow. All we're doing is asking for some kind of certification process, which is a simplified process for those agencies that have demonstrated that they do have the program together.

Senator D'AMATO. I'd be very much appreciative, if you would even have some personal meetings, as it relates to that suggestion. I would hate to see self-certification become a way of life, because it would lessen the effectiveness of UMTA's oversight and pretty soon we will be back to square one. I think most of us agree that some additional review is necessary here.

If you would stay in touch with Anne Miano of my staff, who will be working on this, I'd be deeply appreciative. I think some discussions or meetings rather than just an exchange of letters would go a long way toward resolving this issue. It's a bona fide point. I'm not certain how we handle the selfcertification aspect without really making it a process by which people avoid the scrutiny of oversight.

Let me thank Mr. Gunn, who breathed a sigh of relief. He thought I was going to get into questions about when the consultant's reports regarding the 63d Street Tunnel are going to be made available?

Mr. Ascher feels a lot better. But when will the reports be ready? [Laughter.]

Mr. GUNN. I think Mr. Stanley's estimate of time is approximately correct.

Senator D'AMATO. He indicated that you are looking to do two things: No. 1, determine the cost to complete the tunnel; and No. 2, determine the cost to operate it safely? In other words, the safety element and the cost elements are combined into one. But that is what you are doing initially; is that correct?

Mr. GUNN. Yes, sir.

ISSUES BEYOND CONSTRUCTION

Senator D'AMATO. Then there is an issue which goes beyond construction. I imagine you will be making an analysis with respect to the tunnel's operation. That is something the MTA has to decide, whether or not the benefits to be derived from opening the tunnel—if it can be safely operated, exceed the costs to repair it and the cost per passenger to run it. Is that the second element?

Mr. GUNN. Yes, sir. That will be completed, once we know we have an estimate of when we will have it physically ready for operation, but we can't do our estimate of the costs to complete until these two studies are done.

Senator D'AMATO. Sure. Now let me ask you this. Do you foresee an additional component which involves the studying of some transit extension in order to bring additional people, whether it be by bus, subway, or light rail, to the tunnel, in order to make it more feasible? Is that another aspect?

Mr. GUNN. Yes, sir. With regard to the 63d Street Tunnel, particularly, the board, has voted to adopt the local connection, if you will, which is the extension of the tunnel from 21st Street over to Queens Plaza. That doesn't mean that's what you do, but that's the current board policy.

Senator D'AMATO. I have a comment, that I have some doubts about the local connection.

Mr. GUNN. If you could connect it into the independent facility, it would give you something other than a subway there.

Senator D'AMATO. Let me ask this question: Will you be reviewing, in detail, the local option that has been suggested by the board? I think it's necessary.

Mr. GUNN. Yes, sir. I think when you look at the cost to operate, you have several costs. One is the cost of operating in its current configuration, which is the stub end of 21st Street. That's fairly easy to develop. Assuming that we don't come out with something in these two studies that affect that operating cost, that's probably not going to happen. The next phase, though, if you look at the cost of some sort of an extension beyond 21st Street into the existing system in Queens or to another destination, that is much more complicated.

Senator D'AMATO. Is that something that is forthcoming?

Mr. GUNN. We will put a cost on the local connection. In order to do detailed costing of the other proposal, you have to have a firm plan idea. In other words, the transit authority has to know where the board wants to go, because there are sort of a limitless number of possibilities.

Senator D'AMATO. Let me suggest to you, as we talk about the local connection, that the MTA develop a clear picture of how many passengers we talking about moving. We need a good estimate of the potential transit benefits, because if we're going to be talking about spending hundreds of millions of dollars and the benefits are going to be marginal, then we have to be realistic about our plans. The days of being able to draw down on hundreds of millions of dollars simply because we put in an application are over.

Mr. GUNN. I agree with you.

Senator D'AMATO. I hope so, David. I'm not laying this on you, but it seems to me that in the past that was not done. In this particular case at some point in time, someone should have said, "Wait a minute, maybe we should defer this"—long before you arrived on the scene. I hope that we learn from this experience where lack of planning and lack of preparation can lead. Those were the grand ideas, to get bond issues, so people will say, well, we're actually going to build this. We'll satisfy this political group as well as all the different constituencies. I would suggest, that times have changed. I'm going to be looking for solid planning and justifiable projects.

Mr. GUNN. We will put some numbers together on that local connection.

Senator D'AMATO. I mean realistic numbers. We can throw around $200 million, or $250 million just like this. When you start saying $200 million to $250 million, it could just as easily double.

Mr. GUNN. It depends on what you want. For example, on the interlocking plan at Queens Plaza, if you want a simple two-track connection or do you want to connect with all four tracks and have a universal junction, the numbers vary tremendously, depending on that decision.

Senator D'AMATO. That's why I think it is important, before we start building a local connection, to identify in terms of fiscal planning, how much money we are really talking about, and what are the expected benefits? How great is the potential benefit in terms of the numbers of people moved, in terms of relief of congestion? Is the project really necessary? All those kinds of considerations.

In the past, that kind of close scrutiny was missing.

Mr. GUNN. In our capital planning right now, we are very cognizant of the scarcity of funds, and our primary thrust and philosophy is to put the money where the passengers are, which makes sense.

Senator D'AMATO. Let me thank all the panelists for coming in. I assure you that we're very appreciative of the suggestions you've made.

Our third panel consists of representatives of engineering firms. We have Mr. James Lammie, president of Parsons, Brinckerhoff, Quade & Douglas, and John W. Leonard, senior vice president, Morris-Knudsen Company.

Mr. Leonard, Senator Symms has asked me to give you his regards and to thank you for your appearance here today. He is at another meeting, I believe, at the Finance Committee, and wasn't able to join us.

John Polutchko, vice president of Dynatrend, Inc., of Rosslyn, VA, and Sam Elias, vice president of Transportation and Distribution Associates.

Gentlemen, we thank you for your participation. Mr. Leonard, if you would start.

STATEMENT OF JOHN W. LEONARD, SENIOR VICE PRESIDENT, MORRISON-KNUDSEN CO., INC., BOISE, ID

Mr. LEONARD. Like Henry VIII said to his fifth wife, I don't plan to keep you very long.

I am John W. Leonard, senior vice president and chief engineer of Morrison-Knudsen in Boise, ID.

I have a prepared testimony.

Our company was founded in 1912 by Messrs. Harry Morrison and Morris Knudsen, a farm boy from Illinois, and a Dane. They went into a business with $600 and six mules. We now have $700 and 25,000 mules.

In our fifth generation of management, in many countries and many States, we have diversified into design engineering, shipbuilding, real estate development, railroads, powerplants, constructions of all types, industrial and commercial. In the field of construction management, over 10 years ago, we saw demand in that field. We don't do a bad job in it for both private and public projects, but we design, manage and contract, and manufacture.

I've been with Morrison-Knudsen for 35 years. I was in my own construction company for several years before I went broke. I am a graduate of civil engineering from MIT.

Senator D'AMATO. I want to, at this point, make note of your candor. It's very refreshing the way in which you presented your background. I don't think there are very many witnesses who have been as candid before any committee.

Mr. LEONARD. I am a graduate in civil engineering of MIT in 1947, registered in three States, list of publications, and so forth. I was inducted into the National Academy of Engineering for innovative application of engineering to major construction projects, especially in the area of mechanized tunneling and coastal and harbor construction, which I consider not bad for a non-Ph.D. from Idaho. In 1985, I received the Beaver Award for outstanding achievement in heavy construction and engineering.

I spent a good bit of time in various transit projects—San Francisco, Boston, New York, and Washington.

INDUSTRY HAS IMPROVED

The first point, general. Industry has significantly improved in the last 20 years in all areas. A lot of experience in many different locations. This applies to designers, geotechnical managers, UMTA, State agencies—even the poor dumb contractors.

Industry now has recent data base for forecasting use of transit facilities. Obviously, part of the problem in the early 1960's was that the data based on subways built 40 years prior, and during that 40 years, we concentrated on highways and bridges, nationally. Utilization of these facilities generally exceeded forecasts. This may have mislead the forecasters when we turned back to transit systems. Now we have current data on the latter.

Second, initial stage of the project. The bill is a vehicle to force agencies to do what they're capable of doing with some help from the reputable national, regional firms that are responsive. It is something they should do in the stages up to initiation of the funding. I do not see in this bill a requirement for this to be turned over to a construction manager. This is a decision the authority is best qualified to make with jawboning with UMTA. At least that's the way I read the bill.

When we read specifications, we often say, I know what they say, but what do they mean? UMTA is knowledgeable. They've got some good hands with multiproject experience.

Now, I heartily endorse the report prepared in 1978 under the auspices of the National Academy of Sciences by the U.S. National Committee on Tunnel Technology of the National Research Council.

I have sent you a copy of this. I have also since found an executive summary of it, which makes it less terrifying. I strongly endorse that. There's a good bunch on this committee, a fine chairman. They represent the total spectrum of those involved. They even had a token lawyer—if there is such a thing. The committee set out 6 major objectives in 34 steps on the proper management of these projects. If I were to criticize this report, it is not strong enough on rider surveys, which may be one of the Senator's main complaints.

Since I suggested industry has now better and more recent data, I think the bill could be modified to instruct the Secretary to require adherence to this report with additional emphasis on rider surveys.

CONSTRUCTION STAGE

Third, construction stage. I would not like to see a new shooter in the oversight for UMTA in this phase. I don't believe it is necessary, because of the competency mentioned previously and also the cost, at least not in a full-blown role.

I think there is another factor today of no small magnitude with the cast of characters existing—the contractor, the owner agency, the designer, the designer's consultants and/or consulting board, maybe the construction manager.

If something comes up different than expected, and is guaranteed to come up, particularly if it is underground, it is a bitch to resolve. Nothing happens. There are too many cooks, for openers, and everyone is increasingly worried about getting sued. It takes forever and increases costs and delays.

I have this picture here which I think might represent what I am discussing on this report, page 2 of this report. You will notice it has a group sitting around. I have added to it the owner, the designer, UMTA, the consultant, UMTA's construction manager, and the contractor, and this is a real problem, Senator.

The motion to take immediate and decisive action was tabled until the next meeting.

In summary, it is a good bill. The bill should incorporate the 1978 tunneling report with possible adding of some rider surveys.

Oversight management is desirable, but unless it is limited in scope I think we might be trying to do something that I would liken to castrating a mouse with an ax.

Thank you for the opportunity to testify.

[The complete prepared statement follows:]

WRITTEN TESTIMONY BEFORE THE SENATE COMMITTEE ON BANKING, HOUSING AND URBAN AFFAIRS

BILL S. 1931

JOSEPH M. FLETCHER, EXECUTIVE DIRECTOR
METRO-DADE COUNTY TRANSPORTATION ADMINISTRATION

IT GIVES ME GREAT PLEASURE TO APPEAR BEFORE THIS SENATE COMMITTEE HEADED BY SENATOR ALFONSE M. D'AMATO TO TESTIFY ON BILL S.1931 WHICH WILL REQUIRE CONSTRUCTION MANAGEMENT OVERSIGHT ON MAJOR CAPITAL PROJECTS. LET ME CATEGORICALLY STATE AT THIS POINT THAT I AM IN COMPLETE SUPPORT OF BILL S. 1931. AS THE EXECUTIVE DIRECTOR OF THE METROPOLITAN DADE COUNTY TRANSPORTATION ADMINISTRATION ONE OF MY RESPONSIBILITIES ENTAILS ALL ENGINEERING AND CONSTRUCTION ACTIVITIES RELATED TO IMPLEMENTATION OF NEW TRANSPORTATION SYSTEMS AS WELL AS EXTENSIONS OR MODIFICATIONS TO EXISTING ONES. AS SOME OF YOU MAY BE AWARE, THE CONSTRUCTION OF METRORAIL RECEIVED SOME UNFAVORABLE ATTENTION AND CERTAIN ALLEGATIONS ABOUT SHODDY CONSTRUCTION WERE MADE. AS A RESULT, THE URBAN MASS TRANSPORTATION ADMINISTRATION SELECTED AND CONTRACTED DIRECTLY WITH THE FIRM OF MORRISON KNUDSEN TO PERFORM CONSTRUCTION MANAGEMENT OVERSIGHT. AT THE SAME TIME, METROPOLITAN DADE COUNTY IMMEDIATELY ESTABLISHED STRINGENT QUALITY CONTROL AND QUALITY ASSURANCE FUNCTIONS, PROCEDURES AND RESPONSIBILITIES AND INITIATED A COMPREHENSIVE REORGANIZATION, DESIGN ANALYSIS, AS-BUILT INSPECTIONS, TESTING, REPAIRS AND LONG-TERM MAINTENANCE AND MONITORING PROGRAMS THAT RANK, IN MY OPINION, AS PERHAPS SOMETHING THAT HAS NEVER BEEN ATTEMPTED BEFORE IN THE NATION. I ALSO BELIEVE THAT IT STANDS AS A PROGRAM THAT CAN BE USED AS A MODEL AND SOMETHING THAT WE ARE VERY PROUD OF.

THE BENEFITS OF A CONSTRUCTION MANAGEMENT OVERSIGHT CONTRACTOR ARE IN MY OPINION TWO-FOLD. FIRSTLY, IT PROVIDES THE FEDERAL GOVERNMENT WITH AN INDEPENDENT CHECK ON THE STATUS OF CONSTRUCTION ACTIVITIES BEING PERFORMED BY EACH RECIPIENT OF FEDERAL ASSISTANCE AS WELL AS ASSURANCE THAT THE RECIPIENT'S CONSTRUCTION MANAGEMENT PLAN IN BEING FULLY IMPLEMENTED. SECONDLY, IT BRINGS INTO THE PROJECT ADDITIONAL EXPERIENCED MANPOWER WHO CAN BE A GREAT ASSET TO THE RECIPIENT IN THE DAILY RESOLUTION OF DESIGN AND CONSTRUCTION PROBLEMS. THE LATTER REQUIRES, HOWEVER, GOOD RAPPORT BETWEEN THE RECIPIENT AND THE OVERSIGHT CONTRACTOR WHILE MAINTAINING PROPER CONTRACTUAL RELATIONSHIPS. IT IS ESSENTIAL THAT THE RECIPIENT PERCEIVE THE OVERSIGHT CONTRACTOR AS A MEMBER OF THE TEAM WITH THE COMMON GOAL OF CONSTRUCTING THE PROJECT AS DESIGNED, ON TIME AND WITHIN BUDGET AND NOT AS AN UNNECESSARY EVIL WHOSE MAIN FUNCTION IS TO FIND DEFECTS, ERRORS, ETC., REAL OR NONEXISTENT, WITH THE SOLE PURPOSE OF JUSTIFYING THEIR EXISTENCE OR OBTAINING A FINANCIAL GAIN. IN MIAMI, I BELIEVE WE WERE EXTREMELY SUCCESSFUL IN WORKING WITH OUR OVERSIGHT CONTRACTOR AS A TEAM. I CAN NOT EMPHASIZE ENOUGH THE IMPORTANCE OF THIS ITEM TO THE SUCCESS OF THE PROGRAM. I ALSO TOTALLY ENDORSE REQUIRING THE RECIPIENT TO PREPARE AND IMPLEMENT A CONSTRUCTION MANAGEMENT PLAN. MAJOR EMPHASIS SHOULD BE PLACED ON PROPERTY ACQUISITION WHICH USUALLY CONTROLS THE CRITICAL PATH OF THE PROJECT AND AMOUNTS TO A LARGE PORTION OF THE PROJECT BUDGET. CONSULTANTS' BUDGETS AND FEES MUST BE PROPERLY CONTROLLED AND THEY MUST BE REQUIRED TO SUBMIT DESIGNS THAT REFLECT APPROVED CONCONSTRUCTION BUDGETS.

CONSTRUCTIBILITY ISSUES MUST BE FULLY ADDRESSED DURING THE DESIGN PHASE. AGAIN, A TOP-NOTCH AND EXPERIENCED OVERSIGHT CONTRACTOR CAN BE OF TREMENDOUS HELP TO A RECIPIENT IN THIS AREA IF THE PROPER TEAMWORK IS ACHIEVED. IT IS ALSO ESSENTIAL THAT CONSTRUCTION SCHEDULES NOT ONLY BE PREPARED FOR ALL ASPECTS OF CONSTRUCTION BUT THAT THEY ALSO BE CONTINUOUSLY UPDATED TO CONTROL THE PROGRESS OF THE WORK AND ALSO ALLOW THE RECIPIENT TO EFFECTIVELY HANDLE DELAY CLAIMS FROM CONTRACTORS. LASTLY, OUR EFFORTS IN THE AREA OF ESTABLISHING QUALITY CONTROL/QUALITY ASSURANCE PROGRAMS FOR CONSTRUCTION ACTIVITIES HAVE BEEN FULLY DOCUMENTED AND CAN BE SHARED WITH FUTURE RECIPIENTS OF FEDERAL ASSISTANCE ON MAJOR CAPITAL PROJECTS. ONCE, AGAIN, LET ME STATE IN CLOSING THAT I STRONGLY SUPPORT AMENDING THE URBAN MASS TRANSPORTATION ACT OF 1964 TO REQUIRE CONSTRUCTION MANAGEMENT OVERSIGHT ON MAJOR CAPITAL PROJECTS.

TESTIMONY SENATE COMMITTEE ON BANKING, HOUSING AND URBAN AFFAIRS REGARDING S.1931

April 9, 1986

Morrison-Knudsen Corporation

Morrison-Knudsen Company's marketplace is construction in its many facets and has diversified into associated businesses. It is a Delaware Corporation, listed on the New York Stock Exchange, stockholders with an annual volume of two billion dollars.

Morrison-Knudsen Company was founded in 1912 in Boise with $600 dollars and six mules. Started into irrigation canals, railroads, dams. Harry Morrison organized and was president of the group that built Boulder Dam. Prior to World War II and during the war, Morrison-Knudsen did much work in Alaska, naval air bases, highway and bases in the Pacific. A design firm for overseas work was organized following World War II, the firm is now called Morrison-Knudsen Engineers, to design dams, canals, railroads, power lines in 89 countries. The most recent large project is the world's largest dam, Itaipu in Brasil.

In the 1950's Morrison-Knudsen acquired another design firm for industrial construction in Cleveland. Its clients read as a listing of Dow Jones Companies, this firm is now called MK-Ferguson. In 1970 the Company entered into real estate development in nine western states as EmKay Development. At the same time we entered the field of railroad equipment rehabilitation, manufacturing special equipment and transit car renovation with facilities in Idaho and New York. In the late 70's the Company purchased outright a major shipyard in San Diego engaged in building commercial and naval vessels.

Also in the 70's, the Company expanded into mining and now operates various mines in Montana, Wyoming, Texas, Colorado, Tennessee, New Jersey, Utah and Nevada. We ship over 12 million tons of coal per year in that commodity alone. Experience in these mines has been offered to other companies on a design-build basis. The most recent project is 14 million ton per year coal mine in Columbia, South America, which is just coming on-line.

Morrison-Knudsen Company has continued in the construction field as a contractor in 78 countries and in almost every state in heavy earth and concrete, pipeline, marine and underground work.

In the 1970's, seeing a demand for our quality of people with their broad base experience in design, management and construction, we entered the construction management field. At the present time we fill this role at the Saturn Plant in Tennessee.

Morrison-Knudsen's involvement in the transit field has been extensive working in San Francisco, Boston, Washington, New York and other locations.

RESUME

JOHN W. LEONARD

EDUCATION

Massachusetts Institute of Technology - 1947, SB Civil

Senator D'AMATO. Thank you, Mr. Leonard.
Mr. Lammie.

STATEMENT OF JAMES LAMMIE, PRESIDENT, PARSONS, BRINCKERHOFF, QUADE & DOUGLAS, INC.

Mr. LAMMIE. My name is Jim Lammie, president of Parsons, Brinckerhoff, Quade & Douglas.

I ask that my formal testimony be entered in the record. I would merely like to highlight a few points that have been commented on several times.

First of all, I think it is imperative that the plan approval process, as mentioned by Mr. Gunn, not be a delaying factor in the total project cycle. One of the major contributors to cost overruns is project delay, which increases escalation. If the approval process takes any length of time or requires recycling, it is going to cause further delay.

Senator D'AMATO. How would you rectify that?

A LIVING DOCUMENT

Mr. LAMMIE. A plan must be submitted early, and it must be recognized as a living document.

Senator D'AMATO. What do you mean by a living document?

Mr. LAMMIE. By a living document, I mean, for example, that you cannot have an approved construction schedule at the beginning of your construction planning process. You must get the initial plan approved with an outline schedule, then submit an updated and revised schedule later on. If you don't submit the plan until you are ready to break ground and have the final schedule, you will delay the project.

The preliminary construction plan can be prepared very early in the design process, and submitted for approval so that it does not delay construction bids. That is imperative. There needs to be a time limit on that approval.

Senator D'AMATO. Let me ask you this. Mr. Leonard mentioned something that seems to me to hit the crux of some of the very real, very legitimate complaints, and that is we have not accurately estimated the numbers of people who will really be utilizing these facilities, the rider surveys.

Shouldn't that really be carefully reviewed early on so that you don't have a fiasco like the 63d Street Tunnel, and if it was completed on time without the extraordinary cost, it probably wouldn't have been built in any event because you are talking about moving maybe 3,000 people a day?

Or the example of the inflated numbers to justify a project in Detroit for the People Mover or whether it be in Miami, where they estimate 200,000 people a day are going to be moved? That is very questionable. They are moving 20,000 people. Or in Buffalo.

What about that? I think Mr. Leonard is absolutely right.

IMPORTANCE OF PROJECTIONS

Mr. LAMMIE. Projections, of course, are extremely important, but I think UMTA adequately addresses that today in their mandatory alternative analysis process, which goes into this in depth.

But just as with any plan or projection, there will be changes with time—when the price of oil drops, for example, growth projections in Houston and Dallas drop very dramatically.

When the initial plan for the 63d Street Tunnel was developed—I think that went under construction back in the early 1970's—you had one concept. That concept changed.

So you have to go back and periodically reassess your patronage forecasts and see if you are still putting the stations and the line extensions in the right place.

If you go to Toronto, you will find a dead-ended segment of subway, which is the result of changes in the population pattern. They found that it was in the wrong place. So they abandoned that section of subway.

So these things do change. Again, it is a living document. You have to constantly reassess.

As Harry Truman put it, "I am not afraid of making decisions because I can always change my mind." You can set out your initial plan in your initial location, but over time conditions may change and you may have to change your mind.

So the plan and the projections must be treated as living documents which need to be periodically reevaluated.

The second item that I want to stress is that there is a variable level of effort associated with review of each project on each property.

Self-certification was mentioned by Mr. Hellmann, and this might be appropriate. There are some properties that might like to do construcion management themselves without an intermediate construction manager and these might need even more overview attention since they lack an internal check and balance.

If the project is a small project, it would not require as much effort as a large one. A project which is a repetitive project for an agency that has previously done the same kind of a job might not require as much overview effort.

One of the initial evaluations that the CMO or the project management oversight consultant must perform is an evaluation of the level of effort required and what the initial problems are. Then the overview team can be tailored to meet the specific needs of that project.

I can say this, having been the object of an oversight review on both UMTA and non-UMTA projects. On balance, I think it proved to be very helpful. I strongly support S. 1931 because I think it is a step in the right direction.

The project management plan, which I mentioned, is a living document and must be reviewed thoroughly. The concept of project management plans has been preached for about 5 years through a variety of UMTA-sponsored seminars, but these plans are still not in place on certain new starts.

So I think directing, as your bill does, that these be in place is a very valid point and an essential element of the quality control process.

One of the speakers mentioned that more prohibitions should be placed upon UMTA, and I would urge that we not put more restrictions into the approval cycle for transit projects.

Thank you.

[The complete prepared statement follows:]

LICENSES

Registered Professional Engineers - Massachusetts - 1955

Registered Professional Engineers - Washington - 1956

Registered Professional Engineers - Idaho - 1970

PROFESSIONAL ASSOCIATIONS

American Arbitration Association

Beavers

The Moles

Sigma Xi

Society of American Military Engineers

United States Committee on Large Dams

Advisory Board, Stanford University
Department of Civil Engineering
Construction of Transport Facilities, 1976-79

Advisory Board, Colorado School of Mines
Deep Basing Project, 1977

Advisory Board, Gonzaga University
School of Engineering, 1980-85

Advisory Board, Colorado School of Mines
Experimental Rotary Cutter Machine, 1981

American Arbitration Association Board
State of Idaho vs. Arrington Construction Co., 1980

Rapid Excavation & Tunneling Conference
Executive Committee

United States Committee on Large Dams
Concrete Committee

U. S. National Committee on Tunnel Technology
Industry Member

ASCE
Construction Research Council

Gonzaga University
President's Council

Engineering Foundation Asilomar
Reporter - Economical Construction of Concrete Dams
Session VI, 1972

Engineering Foundation Conference Asilomar
Panel Chairman - Super Projects, 1978

Rapid Excavation & Tunneling Conference
Chairman - Session on Tunnel Boring Machines, 1980

ASCE Convention
Panel Member - Contract Administration Disputes, 1977

Massachusetts Institute of Technology
Lecturer - "Construction Estimating", 1969

PUBLICATIONS

"Construction Cost and Design Consideration"
Engineering Foundation Conference Asilomar, 1970

"Automated Tracklaying"
ASCE, Southern Idaho Chapter, 1973

"Plant and Procedure Concept for Rapid Construction of Concrete Dams"
International Commission on Large Dams, 1973
Repeated - American Concrete Institute, 1973
Repeated - Engineering Foundation Conference Asilomar, 1973

Chapter - "Use of Computer in Contractors Engineering Organization"
Handbook of Construction Management and Organization, 1973

"Contractors Use of Computers"
ASCE, Southern Idaho Chapter, 1974

"Problems Related to Construction of Dam Foundations"
Engineering Foundation Conference Asilomar, 1974

"Thoughts on Engineer-Contractor Relations"
Engineering Foundation Conference Asilomar, 1975

"Contractors Engineering Use of Computers"
American Institute of Construction, 1976

"Super Projects - Biggest Problem"
Engineering Foundation Conference Asilomar, 1978

"Contractors Economic Decisions of Machinery Needs in 80's"
American Equipment Distributors, 1981

"TBM's in U.S. - Where Are We"
Rapid Excavation & Tunneling Conference, 1981

"Problems of TBM's Encountering Soft or Fracture Rock and Attempts to Quantify the Limitations of Rock-TBM Relationship"
International Tunneling Association, China 1984

"Design-Geotechnica Equipment Method"
Tunneling and Underground Transport: Future Development in Technology, Economics and Policy Conference
Massachusetts Institute of Technology, 1985

"Technology Transfer Opportunities for the Construction Engineering Community" Panel
The Rocky Mountain Region of The Society of American Military Engineers (SAME), 1986

Estimating Manual

Cellular Cofferdam Design and Estimating

The Good (And The Bad) Earth

Ground Water

Ground Water Tunnel

Tunnel Boring Machines

Tunnels - Pricing and Equipping

Marine Manual

AWARDS

National Academy of Engineering, 1984
For Innovative Application of Engineering
To Major Construction Projects

The Beavers Engineering Award, 1985
Outstanding Achievement in Heavy Engineering
Construction

MILITARY

Volunteer American Field Service - 1944-45, Italy

EXPERIENCE

Experience has largely been in heavy construction including involvement with major transit projects in San Francisco, Boston, Washington, New York and others.

DISCUSSION OF THE BILL

I recognized the rationale behind this bill and it certainly causes concern.

I believe the concern is really driven in major part by changes in project, unrealistic cost estimates and rider surveys.

First point - General

Industry has significantly improved in the last twenty years in all areas gaining a lot of experience in many different locations. This applies to designers, geotechnical managers, UMTA, state agencies, even poor dumb contractors. Industry now has recent data basis for forecasting use of transit facilities. Part of the problem in the 60's was the data base was largely based on subways built 40 years prior and during the ensuing 40 years we concentrated on highways and bridges nationally. Utilization of the facilities generally exceeded forecasts. This may have misled the forecasters when we returned back to transit systems. Now we have current data on the latter.

As to the initial stage of project prior to significant funding and/or commitment:

This bill is a vehicle to force agencies to do what they are capable of doing with some help from reputable National-Regional firms that are responsive. It is something they should do in the stages up to initiation of funding. I do not see in this bill a requirement for this to be turned over to a construction manager. That is a decision the authority is best qualified to make with jawboning with UMTA.

I strongly endorse the report prepared in 1978 under the auspices of the National Academy of Sciences by the U.S. National Committee on Tunnel Technology, National Research Academy. It was submitted to the U.S. Department of Transportation Urban Mass Transportation Administration, National Science Foundation:

"The subcommittee consisted of owners' representatives, designers, contractors, geotechnical engineers, a management expert, a labor official, an insurance specialist, a lawyer, and a geologist. The members were selected on the basis of their knowledge and experience in planning, designing, contracting, and managing construction of underground facilities. To assure a broad balance of perspective, the members were selected from both the public and private sectors and from the universities. As will be described below, other individuals with competence in specific related areas were called on to assist the subcommittee during the study. Thus, the recommendations in this report are based on the judgment and experience not only of the members of the subcommittee but many other experts as well."

If I were to criticize the report, it is not strong enough on rider surveys which as I read is the Senator's main complaint. Since I suggested industry has now better more recent data, I think the bill could be modified to instruct the Secretary to require adherence to this report with additional emphasis on rider surveys.

UMTA is a qualified, knowledgeable organization. They've been to the fire and have qualified personnel with multi-project experience.

As to construction stage:

I would not like to see a new shooter in oversight for UMTA in this phase. I don't believe it's necessary because of the competency mentioned previously - and it also costs.

I think there is another factor today of no small magnitude with a cast of characters: contractor, owner-agency, designer -the latter's consultant's and/or consulting board maybe a construction manager. If something comes up different than expected and it's guaranteed, particularly if it's underground, it's next to impossible to resolve.

Nothing happens, too many cooks for openers and each one increasingly concerned about getting sued. It takes forever and increases cost and delays.

Summary:

This is a good bill. Suggest the Tunneling Committee report of 1978 be referenced in it along with increased emphasis on rider survey. I only question, given today's condition, the desirability of an oversight manager.

J. W. Leonard

TESTIMONY BEFORE THE SENATE COMMITTEE
ON BANKING, HOUSING AND URBAN AFFAIRS

ON S 1931

9 APRIL 1986

BY: J. L. LAMMIE PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Gentlemen. My name is James L. Lammie. I am the President of Parsons Brinckerhoff Quade & Douglas, Inc. Some 60% of the business of our 2,000 man firm is in the public transit sector and we have been involved in design, construction management or general management roles on virtually every transit system in the United States over the past 100 years. From this perspective we strongly support the general concept and the specific provisions contained in Senate Bill S 1931.

Since its establishment in 1964, UMTA has become the major funding source of mass transit capital projects in the United States. In just the past decade alone, UMTA funded grants for construction of new rail transit systems have risen steadily to the current level of about $400 million per year. Despite anticipated reductions in UMTA capital grants resulting from federal government deficit reduction efforts, existing commitments indicate that a substantial annual investment in transit construction may continue. Thus, like any financier, UMTA must make certain that the projects it supports are efficiently and properly managed and built in accordance with approved project guidelines. In major transit capital projects, the volume of design documents and material to be reviewed, coordinated and approved is staggering -- as is the number and magnitude of construction contracts requiring daily monitoring. These burdens can tax the local grantee agency beyond its capacity and can result in mistakes. The need for a stronger UMTA overview role and alternative courses of action to achieve that goal were spelled out in a report entitled "Construction Management Oversight Options for UMTA", prepared by DOT Transit Systems Center in 1983.

While on balance the overall track record of construction management on transit projects has resulted in many successes, recent design and construction problems on several transit projects, widely reported in the press, have shown a need for increased overview activity on the part of UMTA. The development of a new rail transit system or major transit facility is frequently the largest construction project undertaken in a given urban area. The local transit authority sponsoring a new rail start in most instances has no prior experience in construction projects of this magnitude. The local transit agency must undergo a long and often painful learning process which involves a multitude of areas including: planning, finance, contract administration, design, procurement, construction management, startup and operation. Staff expertise may be thin in these infant agencies, and the organization may initially lack definition and clear accountability.

UMTA, which provides the major funding for these projects, recognizes it has responsibility to provide a stronger, more effective role in monitoring its grantees. Currently, however, UMTA management oversight technical staff has, when compared to selected agencies performing similar roles, a significantly higher workload, over $300 million of construction per available oversight labor year. As UMTA staff resources continue to decline, this workload is likely to increase. We all recognize that the fundamental responsibility for cost effective application of grant funds rests with the recipient but this does not diminish UMTA's overall responsibility. It only permits sharing the blame when something goes wrong.

The fact that there is a need for an increased level of management overview on transit projects is not an issue in this audience. All of us in the industry know that federal dollars are limited and must be spent efficiently. There are too many unfunded transit modernization and justified expansion projects waiting in line to permit wasting dollars as a result of poor management. With the transit sector competing for dollars in the public arena along with other federal programs, we cannot afford the negative impact of headlines in the Washington Post or the New York Times about projects which are over budget, behind schedule or which contain serious flaws. The issue, then, is not whether additional management overview is needed but whether the approach contained in S 1931 is the best way to provide that added overview.

While different transit systems may have certain similarities with respect to discrete functional areas or components, each system is fundamentally unique and must be assessed on its own merits in terms of how well it satisfies established procedures, standards and policies. Each system has its own life cycle, its own management structure, is at a particular stage of planning, design and/or construction, and has its own unique public environment. This means that any guidelines with respect to a mandated oversight role must be sufficiently flexible to tailor the oversight team to cost effectively match specific technical resources to the unique project need. Without going into a detailed discussion of other options, I would just state that S 1931 meets this test.

S 1931 contains these specific elements:

(1) Authorization for a direct UMTA contract for construction management oversight, 100% federally funded.

(2) Mandatory preparation of a construction management plan by the recipient which must be approved by UMTA.

(3) Immediate preparation of implementing guidelines by UMTA.

I would like to comment on each of these elements in turn.

Construction Management Oversight

Parsons Brinckerhoff has been exposed to the management oversight consultant approach on an UMTA funded transit project, the Guadelupe Corridor Light Rail project in Santa Clara County, California. Our work as General Engineering Consultant on this project came under evaluation by another firm which reported directly to the UMTA Regional Administrator. While our firm was obviously not directly involved in the discussions between UMTA and the recipients, we did find the overview reports to be constructive and beneficial and, very importantly, the overview process did not to our knowledge interfere with the normal project management process nor did it alter any of the defined project responsibilities or liabilities. With increasing frequency our firm's federal and non-federal projects are being exposed to overview consultants, value engineering consultants and peer reviews. Our initial professional concern with having "too many cooks in the kitchen" has faded as we have found each of these reviews to be generally helpful.

We know there are in the United States today, adequate technical resources to perform the oversight role. Many transit engineering consultants and large construction firms of national scope offer a full range of transit and management services. There were concerns expressed earlier with a potential conflict of interest when one firm is overviewing another firm's management of a transit project while concurrently the two firms are working together on another project. In our professional consultant environment such concurrent associations are normal and conflicts have not and will not occur. Of course, the construction overview consultant cannot be directly involved as the general engineering or general construction consultant on the same project he is overviewing.

Senator D'AMATO. Thank you very much.
Mr. Polutchko.

STATEMENT OF JOHN POLUTCHKO, VICE PRESIDENT, DYNATREND, INC., ROSSLYN, VA

Mr. POLUTCHKO. Thank you, Senator, it is good to see you again. I thank you for this opportunity to testify regarding S. 1931.

Senator, I know you are somewhat familiar with my company and the work we have been doing for UMTA. For the information of your colleagues on the committee, I have attached to my statement a summary of my credentials and those of Dynatrend, Inc.

It is my position that sound, comprehensive management plans are the very foundation for the execution and control of all projects. They are alive and evolving, as Mr. Lammie just mentioned, and they are the coordinating and communicating media between all project participants.

S. 1931 specifically addresses the requirements for construction management plans, the link from conceptual planning and design phases to the construction phase.

I would like to address an issue which is inferred by the combined provisions of this bill; namely, that the construction management plan contains the scale by which project performance is to be measured and evaluated by the oversight contractors on behalf of the UMTA.

INTERRELATED PROJECT VARIABLES

The three interrelated project variables of function, cost, and schedule must be identified and controlled. A change to any one of these affects the other two. So to be manageable, the project's plan must break the work down into tasks or elements. Federal and industry practice for many years in successful projects suggests—nay, requires the use of a framework of product-oriented work breakdown structures and the assignment of responsibility, with commensurate authority, for the execution and control of resources for these tasks and elements.

Project specific work breakdown structures ideally will be prepared upon project initiation, to serve as a basis on which the work is divided into these manageable and identifiable elements.

Since this work breakdown structure by element forms the baseline for functional, cost, and schedule control, these elements, their specifications, their apportioned costs, and their schedules must be entirely consistent with the overall project, physical and functional description, its cost and its schedule. In other words, the total must be equal to the sum of its parts.

Over a lengthy construction period, changes are inevitable, for good—or bad—but justifiable reasons. Management's challenge is to assess and minimize the impact of changes and to control them, with responsibility and authority for resolution and implementation delegated to the lowest possible tier of the project organization.

Work breakdown, or packaging, into defined manageable elements should be presented in the baseline construction management plan. This is the only way to effectively plan and then manage these projects. Construction management oversight and project performance evaluation need these scales of measure that are prepared by the originator.

I would like also to address the subject of construction management plans for ongoing projects.

DELAYS ARE COSTLY

Many hundred millions of dollars of Federal grants remain uncommitted to delayed and uncompleted projects. These delays suggest that there remain some serious problems to be addressed by the involved parties and agencies. These issues range from completion of the punch lists for essentially completed projects; a lack of acceptance by operating agencies; management-directed delays; or design problems.

The amount of public money involved is very large, and continued delay either increases the cost or, more likely, results in reduced public benefit per expended dollar.

Resolution of these problems requires the attention of all of the respective and responsible participants to reach agreement on plans of action and to commit to executing and completing these actions.

If one does not exist, I suggest that a construction management plan beginning on day "x," whatever is chosen by the parties, can set forth these implementation actions and serve as an interface agreement document between all involved parties. Each participant would know his role, what he must accomplish, and how it fits to the agreed objective. Parenthetically, Mr. Chairman, the obverse of that coin would also be obvious to all.

Furthermore, the plan would specify a project manager, who is the leader, the coordinator, and integrator of efforts, and the decisionmaker for problem resolution.

Most importantly to all of us, this construction management plan would establish the schedule and cost for completion of these projects in a format of manageable and monitorable work segments appropriately assigned to responsible parties.

I believe at this point in time for many of these projects how far behind or overexpended they are is less important than setting realistic and agreed schedules and costs to complete that can now be managed, monitored, and controlled.

Thank you for your attention. That concludes my prepared statement. I would be pleased to elaborate or to answer any questions the committee may have.

[The complete prepared statement follows:]

The construction management oversight role is not to advise UMTA on how to run a particular project, nor is it the function of the oversight manager to recommend solutions based on his specific experience gained on other transit systems. Instead, the oversight role is to evaluate objectively a transit project on the basis of that project's UMTA approved construction management plan, established industry principles, policies, standards and procedures and to draw upon general industry experience to perform the construction field reviews. The purpose of the oversight function is to provide UMTA with a mechanism to make certain that the system is properly executed, to ensure that feedback loops are in place to correct weaknesses found through audits, and to report results of monitoring performed over longer time periods. If properly performed, the oversight function will result in the implementation of a series of on-going corrective actions and improvements to the systems under review through continuing dialogue between UMTA and the grantee.

Construction Management Plan

The need for a comprehensive project management plan developed early in each project has long been recognized. An UMTA funded project conducted by the Building Research Advisory Board in 1979 produced "Guidelines for Developing a Project Management Plan" for urban transit projects. These guidelines were used as the basis of a series of seminars sponsored by UMTA and other agencies from 1982 to 1985 stressing the importance of and an approach to the development of comprehensive project management plans. As a result, most new system starts over the last three years have developed such management plans.

S 1931 sets forth ten specific elements which must as a minimum be contained in the construction management plan and also establishes the need for UMTA approval of the plan. The ten elements identified are certainly valid components of a sound construction management plan. Subsection (C) (3), "a comprehensive construction schedule approved by both the recipient and the prime contractor on the project", raises two questions. If "prime contractor" refers to the agency's construction manager who is on board early in the design process, it is an achievable objective. If "prime contractor" refers to the major "construction contractor", the timing is wrong. The construction management plan should be finalized and procedures approved well before the initial contract goes to bid on a major construction project. Item (3) also raises the point that the construction management plan, as with any plan, is a living document which will evolve over the life of the project and the approval process must provide the latitude for periodic updates.

The UMTA Guidelines

S 1931 requires the issuance of UMTA guidelines within 120 days. This would certainly seem to be an achievable objective since these guidelines would be based upon existing UMTA procedures for Project Management Oversight Consultants which are currently in use on several projects. Key in the development of these guidelines is the requirement that the guidelines and the plan approval process must not become delaying factors in the project life cycle. Cost escalation due to delays in the environmental, planning or decision-making processes are major contributors to the cost overruns which we are striving to reduce. If UMTA guidelines introduce more delays in the approval cycle, the construction management oversight process could become a part of, rather than a solution to, the problem. It would also be highly desirable if a typical construction management plan now in use by some recipient, which is considered acceptable by UMTA, could be included as a sample as a part of the guidelines so that each agency may benefit from the staff work done by others. Ideally, we could then avoid the cost of reinventing the wheel for each new project. The guidelines must also give recognition to the fact that every project is unique due to requirements of state law, the nature of the project, and the experience of the recipient in dealing with such projects so that specification of an oversight effort as a set percentage of construction costs would not be appropriate.

Summary

S 1931 is a positive step forward in reinforcing the check and balance system which must be applied to every major expenditure of federal funds. Added controls must always be balanced against the cost of product improvements. S 1931 has minimal added cost since it only directs the development of a comprehensive construction management plan which prudent management should develop as a matter of course. Unfortunately, this has not always been done.

S 1931 establishes the need for additional construction management oversight but with the flexibility of developing the level of oversight to fit the need. Hence, the incremental cost of the oversight effort should provide a positive return through better quality construction. S 1931 does not propose and should not become a mechanism for delaying or interfering with the decision process or diluting the specific responsibilities of the grant recipient.

STATEMENT BY

MR. JOHN A. POLUTCHKO
VICE PRESIDENT, DYNATREND INCORPORATED

BEFORE THE
SENATE COMMITTEE
ON
BANKING, HOUSING AND URBAN AFFAIRS

U.S. SENATE

APRIL 9, 1986

Mr. Chairman and members of the Committee:

Thank you for this opportunity to testify today regarding S.1931, a bill which would require construction management plans of recipients of Urban Mass Transportation Act Federal financial assistance on major capital projects and which would also provide for construction management oversight of these projects by contractors selected and funded by the Secretary of Transportation.

For the committee's information, I have attached to my statement a summary of my credentials and those of DYNATREND INCORPORATED for which I serve as Vice President, Washington Area Operations. For the past thirty (30) years I have been directly involved with project management, planning, and control for major systems development programs of the Departments of Transportation, Energy, and Defense. Currently, my company and I are engaged in providing management and technical support to projects of the U.S. State Department, the Environmental Protection Agency, the Federal Protective Service, the U.S. Navy, the Urban Mass Transportation Administration and the Department of Transportation's Transportation Systems Center.

Urban transit projects, in particular rail projects, are characteristically complex and of long duration. Consequently, it places even greater importance on the planning and definition of the management systems to be employed because of the magnitude of the expenditures, the large number of project participants, the number of decisions which must be controlled and integrated, and the inevitable changes which occur over the life of the project.

It is my position that sound, comprehensive management plans are the very foundation for execution and control of all projects from the initial concept definition and development, through design, to construction, and ultimately to delivery (or turnover) to the user/operator. That is not to say that these plans, once prepared and approved, are rigid, nor are they implementing documents by themselves. To be an effective management tool they must be concise, kept current, and progressively expanded as detailed information for future actions is developed. The plan must be the coordinating and communicating medium between all project participants (owners, designers, consultants, contractors, operators, and interfacing participants), it must define their roles and responsibilities, identify the leader, present the project objectives, and the strategies for accomplishing the objectives.

S.1931 specifically addresses the requirements for Construction Management Plans. Such plans provide the link from the conceptual planning and design phases of the project to the construction phase.

The minimum provisions to be contained in the construction management plans are stated in S.1931. I would particularly like to address an issue which is inferred by the combined provisions of this bill: namely, that the construction management plan contain the scale by which project performance is to be measured and evaluated by the oversight contractor(s) for the Urban Mass Transportation Administration.

Three interrelated variables exist in every project: function[1], cost, and schedule. A change to any one of them affects the others. Therefore, it is essential that the initial assumptions - - baselines - - be identified and controlled. The original planning should break the work down into tasks or elements using the framework of a product (or output) oriented work breakdown structure and the assignment of responsibility for the accomplishment and the control of resources for these tasks/elements. Cost/Schedule planning for projects usually has its basis in the concept phase of the project. It is given boundaries by legislation, bond issues, city/state/federal funding, and/or approval by appropriate agencies such as transit authorities. These approvals authorize the project(s) and specify goals to be achieved and work to be accomplished together with specific funding and assignment of responsibility for execution.

Ideally, a project-specific work breakdown structure (WBS) should be prepared upon initiation of the project to serve as a basis on which the work is divided into manageable and identifiable elements. (The upper tiers of the WBS are prepared at this time, with lower tiers being further defined during design and/or project execution.) This WBS forms the baseline for functional, cost and schedule control; therefore, the elements of the WBS and their assigned costs and schedules must be entirely consistent with the overall physical and functional project description, cost estimate, and schedule.

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[1] As used here, "function" encompasses features/specifications of design, performance, size, etc., i.e., satisfying the technical requirement or functional need.

Once the baselines are established, they must be managed and controlled. This implies that appropriate procedures and levels of management must be established to review and approve changes to the baselines. Most projects would organizationally limit this authority to a project manager. In large projects, he or she might have a project control staff which would (among other duties) assess requests for changes to baselines, analyze the new proposed plan, insure coordination of impacts with other elements of the baseline plan, and provide recommendations to the project manager. All changes to baselines approved by the project manager must be documented (reflected in the appropriate plans and reports), traceable (don't wipe out the record), and reported to the project authorizing agency (e.g. the transit authority, UMTA, etc.). In our assistance to Federal clients in evaluating troubled projects, establishing "get-well" plans, or determining "lessons learned" we consistently found that they had not established:

a. Defined function, cost and schedule baselines;

b. Control procedures and authority for changes to these baselines; nor

c. Definitions, policy, and guidance for work breakdown structure utilization.

Over a lengthy construction period, changes are inevitable for good (or bad) but justifiable, reasons. The management challenge is to assess and minimize the impact of changes and control them, with responsibility and authority for resolution and implementation delegated to the lowest possible tier of the project organization. Work breakdown, or packaging, into defined manageable elements should be presented in the baseline construction management plan.

Construction management oversight and project performance evaluation need these scales of measure.

I'd also like to address the subject of Construction Management Plans for on-going projects. Many hundred millions of dollars of Federal grants remain uncommitted to delayed and uncompleted projects. The delays being experienced in completion and close out of these projects suggest that there remain some serious problems to be addressed by the responsible and involved parties and agencies. These issues can range from the completion of punch lists on substantially completed projects; lack of acceptance by operating agencies; management directed delays; and/or design problems. The amount of public money involved in these projects is very large, and continued delay will either increase these costs or, more likely, will result in reduced public benefit per expended dollar.

Resolution of these problems requires the attention of the respective and responsible participants to reach agreement on plans of action, and the commitment to execute and complete these actions. If one does not exist, a Construction Management Plan can set forth these implementation actions and serve as an interface/agreement document between the parties. Each participant will know his role, what he must accomplish, and how it fits to the agreed objective.

Further, each will know that there is a Project Manager who is the leader, the coordinator for the integration of efforts, and the decision maker for problem resolution. Most importantly, this Construction Management Plan would set forth the schedule and cost for completion in a format of manageable and monitorable work segments appropriately assigned to responsible individuals. At this point in time, for many of these projects, how far behind and over expended they are is less important than setting realistic and agreed schedules and costs-to-complete that can now be managed, monitored and controlled.

That concludes my prepared statement. I thank you for your attention and would be pleased to elaborate or to answer any questions the Committee may have.

JOHN A. POLUTCHKO

Vice President Washington Operations
DYNATREND INCORPORATED
1911 North Fort Myer Drive
Arlington, Virginia 22209

Mr. Polutchko has thirty (30) years of experience in business development; engineering management; planning, direction, and control of system development programs; and systems engineering and integration for major military, energy, transportation, and space programs. All of this experience has been in, or in direct support to, Systems Program Offices of the Departments of Energy, Transportation, Defense and the National Aeronautics and Space Administration.

Mr. Polutchko has been with DYNATREND for fourteen years and currently is a corporate officer, serving as Vice President, Washington Operations. He was the Project Manager for DYNATREND's three-year contract for technical and management services to the offices of the Assistant Secretary for Fossil Energy, DOE; Project Director of DYNATREND's five year contract with the Department of Energy for Engineering and Technical Support Services for the Magnetohydrodynamics (MHD) program; and Deputy Project Director of DYNATREND's contract with the Department of Transportation for Program Management, Planning and Control Services for the Federal Railroad Administration's Northeast Corridor Improvement Program (NECIP).

Prior to DYNATREND, Mr. Polutchko spent ten years with the Avco Systems Division as Program Control Manager and Projects Manager for several RDT&E projects. He began his career with the USAF Systems Command at Wright-Patterson AFB and L.G. Hanscom AFB, progressing-from Project Engineer to Deputy Division Chief in his six years with USAF System Program Offices.

He is a graduate of the Massachusetts Institute of Technology (Aeronautical Engineering) and has done post-graduate study in Project Management, MHD Power Generation, and Russian language.

DYNATREND INCORPORATED

CORPORATE PROFILE

DYNATREND Incorporated was formed in November 1971, is headquartered in Woburn, Massachusetts and has a primary operating location in Arlington, Virginia. On-site offices co-located with customer facilities are in Cambridge, MA; Rosslyn, VA; Research Triangle Park, NC; and Washington, DC. Staff personnel currently number 175.

Since its formation in 1971, DYNATREND has provided technical and management services to Federal clients from the Departments of Transportation, Defense, Energy, State, the Environmental Protection Agency (EPA), and General Services Administration's Federal Protective Service. DYNATREND's services focus on project management; transportation systems planning, engineering and analysis; physical and information security; information sciences; and systems engineering.

The company's four major business areas are Transportation, Physical and Information Security, Defense, and Information Sciences.

The Transportation business area is highlighted below:

In support of our nation's transportation systems, DYNATREND has provided technical, management, and consulting services to virtually every Federal transportation administration. We have applied our interdisciplinary staff resource capabilities to address the complex issues facing government at every institutional level including state and local. Our personnel possess academic backgrounds and extensive experience in transportation engineering, planning, safety and security systems analyses, technology assessment, and project management. We have successfully supported a broad range of customer requirements including urban transit, paratransit, automated systems, and heavy rail. We have supported diverse activities which range from program management support for a passenger rail service improvement program, to an impact assessment of the Federal Aid Highway Program on state and local government road construction programs, to analysis and documentation of air transportation data needs, information flows, and information management operating procedures.

Current projects for the U.S. Department of Transportation (DOT) Urban Mass Transportation Administration include a detailed review of rail modernization planning processes and techniques used by the nation's rail transit systems and the compilation of this information into a guide for transit planners. The guide is intended to help planners apply rail modernization funding effectively. Also in the interest of cost-effective application of federal funds is an assessment of the New York City Transit Authority's capital project construction management systems and practices. Another major DOT project is our transportation information support services contract with the Transportation Systems Center, Cambridge, Massachusetts. Services include the assessment of transportation-related topics and issues utilizing appropriate quantitative and qualitative analytical techniques, information dissemination, and the operation of a technical reference center.

Senator D'AMATO. Thank you very much.
Mr. Elias.

STATEMENT OF SAMY E.G. ELIAS, VICE PRESIDENT, TRANSPORTATION & DISTRIBUTION ASSOCIATES, INC., A SUBSIDARY OF DAY & ZIMMERMANN, INC., PHILADELPHIA, PA

Mr. ELIAS. Thank you, Senator.

I am here to testify in favor of Senate bill 1931 regarding construction management plans and construction management oversight on all federally funded major transit capital projects.

I appreciate the invitation to testify and wish to congratulate the Senator for having the foresight and initiative in introducing this bill. With only a minor change, which I will address later, we believe the bill to be appropriate and very timely. I have provided a written statement and would appreciate its being included for the record.

Day & Zimmerman was founded in 1901, and it has grown from a 2-man engineering firm to a 10,000-strong, one of the world's largest and most diversified, professional service firms. It operates from more than 50 locations in the United States and has completed projects in more than 75 countries.

Over the years our firm has developed the know-how and the experience in supplying exactly the project management oversight this bill is asking for.

We have been retained by FRA, by UMTA, and by the private sector to conduct project management oversight, sometimes referred to as project monitoring.

Last year our firm was once again retained by UMTA to develop project management oversight procedures. The objective of this study was to provide UMTA with procedures to assure quality control and the safety of major capital transit projects. We commend UMTA for recognizing the need in this area.

PROJECTS WORTH $18 BILLION IN THE PIPELINE

One estimate, Senator, is that there are currently some 18 billion dollars' worth of new projects, project extensions, and capital improvements in the pipeline at UMTA. Since the creation in 1964, UMTA has experienced a marked expansion of its capital assistance programs to a point where virtually every mass transit project of notable size is supported by Federal funds.

By 1985, this capital assistance amounted to more than $2.5 billion annually, and totaled over $30 billion over the last 20 years.

The primary burden of project management administration falls upon the 34 people in the regional offices and headquarters of UMTA.

As you mentioned, Senator, typically an engineer in UMTA is responsible for a very large work load, approximately 750 million dollars' worth of projects.

It should be noted, however, that UMTA, under the leadership of Administrator Ralph Stanley, has begun to remedy this situation through the retention of 10 engineering firms to conduct project management oversight.

Mr. Chairman, you might have noticed that I have been using the term "project management oversight" quite a bit. This is the crux of the one technical suggested amendment in S. 1931.

Project management oversight consists of review and audit functions performed by the granting agency over the grantee to ensure that the project is properly implemented within target ranges of cost, schedule, and specifications.

We believe very strongly that the efficient deployment of any major transit project requires careful planning, management, technical monitoring, scheduling, and budgeting to ensure that the project comes on time and under cost. This must be ensured over the entire course of the project, which typically can be expressed in some six different phases.

The first phase is system planning, which includes feasibility and initial planning. Other phases are alternative analysis and environmental impact statement, preliminary engineering, final design, system construction, and prerevenue and testing.

Thus the implementation of a major transit project is not a single event, but consists, really, of numerous multistage tasks, which are conveniently grouped into phases. The output from one phase is usually the input to the following phase. As an example, developing the performance specifications during preliminary engineering, require the input of system definition, performance requirements, and patronage forecasting in order to define the size and number of the vehicles, the headways and the capacity. Thus a successful completion of each phase is integrated with and dependent on other phases. It is thus clear that if the project management oversight function is to succeed, it must cover and recognize the importance of all project phases. Note that system construction is just one of the six phases of a project. Therefore, we recommend that the word "construction" in the bill be replaced by the word "project" to accurately reflect what we believe is intent of this bill.

In summary, we believe that as a granting agency, UMTA has an interest in the program's oversight role to ensure that the projects are completed on time. Because of the staff limitation, UMTA has had until recently, minimum involvement in the oversight role. A project management oversight function to monitor and review major transit capital projects from concept through design construction can greatly be enhanced by the statutory and budgetary support that this Senate bill is proposing.

I believe it is a good bill. It is good for UMTA, good for the grantee and, indeed, good for the country, and we support it wholeheartedly.

Thank you for giving us the opportunity to testify.

[The complete prepared statement follows:]

TESTIMONY ON
Senate Bill 1931
Construction Management Oversight

By

Dr. Samy E. G. Elias
Vice President
Transportation and Distribution Associates, Inc.
Day & Zimmermann, Inc.
Philadelphia, PA

BEFORE THE

Committee on Banking, Housing and Urban Affairs
United States Senate
April 9, 1986

Members of the Senate Committee on Banking, Housing and Urban Affairs, Ladies and Gentlemen, my name is Samy E. G. Elias and I am a Vice President with Transportation and Distribution Associates, Inc. (TAD), a subsidiary of Day & Zimmermann, Inc. (D&Z), of Philadelphia. I am here to testify in favor of Senate Bill 1931, requiring Construction Management Plans and Construction Management Oversight on all federally funded major transit capital projects. We appreciate the invitation to testify and wish to congratulate Senator D'Amato for having the foresight and the initiative in introducing this Bill. With only a minor change, which I will address later, we believe the Bill to be appropriate and very timely. We would like to see the Urban Mass Transportation Act of 1964 amended to incorporate this Bill.

DAY & ZIMMERMANN PROFILE

Founded in 1901, D&Z has grown from a two-man engineering partnership to one of the world's largest and most diversified professional service firms. It operates from more than 50 locations in the United States and has completed projects in more than 75 countries.

D&Z serves private industry, public utilities, governments and their agencies, and educational and financial institutions. We structure our multi-disciplined capabilities so that every project is executed cost effectively.

The company's fundamental corporate objective is to be a distinguished and responsible leader in each of its service markets. To achieve this objective, every assignment is performed to exacting professional standards.

Guided by this commitment to excellence, we've grown and diversified - assuming a leading role in the engineering, construction, operations, architectural, consulting, security, technical service and real estate appraisal industries, relying on the talent of over 10,000 employees. TAD, which was acquired by D&Z in 1982, specializes in professional services in the transportation industry.

PERTINENT EXPERIENCE

Project management oversight may briefly be defined as responsibility for developing and implementing measures to assure assessment, evaluation, and reporting on key technical, contractual, and administrative areas associated with a project. The goals are to maintain constant and effective measures, along with periodic reviews of management at all levels, to keep the project within target ranges of cost and schedule and maintain system requirements, safety, and quality assurance.

Over the years our firm has developed the "know how" and the experience in supplying exactly the project management oversight this Bill is asking for. We have been retained by the FRA, UMTA, and the private sector to conduct project management oversight (sometimes referred to as project monitoring). These contracts addressed the same tasks as those contained in the proposed Construction Management Plan. It should be noted that these projects were accomplished on time and within budget.

Specifically, under the Railroad Revitalization and Regulatory Reform (4R) Act of 1976, the Office of Federal Assistance of the FRA engaged our firm to review and evaluate applications made by railroad companies for financial assistance and to monitor the subsequent rehabilitation work.

The objective of these task-order assignments was to provide technical engineering and transportation operating review and evaluation of applications for Title V funds as provided for in the 4R Act and, after the execution of financing agreements, to monitor those projects. The scope of work also included the evaluation of projects proposed for funding under State Rail Programs and the inspection and evaluation of various facilities, equipment, routes, and/or operating and maintenance practices of Amtrak and Conrail.

The evaluation and/or monitoring assignments undertaken under this contract involved the following areas:

- Track (including turnouts and crossings)
- Roadbed stabilization
- Right-of-way improvement
- Drainage
- Highway grade crossings
- Signal systems
- Train control systems
- Communication systems
- Lighting (yard)
- Bridges
- Buildings and other structures
- Yards, terminals, and port facilities
- Electrification
- Shops
- Inspection facilities
- Freight and passenger equipment.

Under the provisions of Title V of the 4R Act, the Chicago and Northwestern Transportation Company (CNW) applied to the FRA for approximately $123 million to rehabilitate portions of its 500-mile corridor between Chicago and Fremont, NB. The project included track, signal, bridge work, tie renewal, ballast undercutting, renewal of jointed rail track with continuous welded rail, reconfiguration of interlockings, and modernization of the signal and control systems. The application also included extensive work in the Proviso Yard at Chicago. The Proviso work plan included turnouts, yard and running track rehabilitation, improvement to hump drainage, renovation of signal cable and terminals at the hump, switch heaters, and renewal of car retarders.

Our firm analyzed all proposed work in order to evaluate cost estimates, traffic and revenue projections, management control systems, CNW's ability to perform the proposed work, projected efficiencies and cost savings, and long-term maintenance plans. As part of this analysis, we performed field inspections at locations where work was proposed. After the financing agreement was in place, we monitored the ongoing work to assure adherence to quality, schedule, and cost.

On a second project the CNW applied to the FRA for approximately $500 million in loan guarantees under the terms of Section 511 of the Railroad Revitalization and Regulatory Reform Act. The application was for a massive rehabilitation of CNW's lines from Joyce, NB to Shawnee, WY, and for CNW's 50% share of the construction cost for a new line to be built jointly by the Burlington Northern Railroad and the CNW.

We were retained by the FRA to evaluate the engineering feasibility of both CNW applications. TAD's work included:

- Inspection of existing facilities
- Evaluation of project schedules
- Analysis of resource availability
- Analysis of cost estimates
- Review of alternative routes
- Determination of application completeness
- Operations analysis
- Review of work procedures, methodologies, and project organization
- Review and evaluation of comments of other parties regarding the applications
- Assistance to the FRA in negotiations with the CNW.

The application for funding was subsequently withdrawn by the CNW and financing was arranged in private financial markets.

Our firm was also assigned by FRA to monitor a $129.5 million rehabilitation project designed to create a high-quality, high-capacity rail corridor on the Illinois Central Gulf Railroad (ICG) between Chicago and New Orleans.

Functioning as a representative of FRA, TAD's specific responsibilities were to monitor ICG's performance in terms of the following criteria:

- Compliance with standards and specifications contained in Attachment B of the Financing Agreement
- Accuracy of progress reporting and scheduling as set forth in Exhibit C of the Application
- Compliance with Attachments A and B of Exhibit C of the Financing Agreement as to scope, location, manner, procedures, sequence, rationale, cost estimate, and schedule
- Conformity of drawdown requests to need and consistency with actual and planned expenditures
- Appropriateness of changes in expenditures and accounting plans during the project.

In the performance of this work, our personnel made monthly inspections of work in progress and reported their findings in monthly progress reports. Where irregularities in any phase of work were noted, we made appropriate recommendations to bring the project back into conformity. Throughout the project, variance reports prepared by the ICG were analyzed and revisions to schedules required by logistical problems during the project were reviewed by our team.

In the 1970s our firm worked for UMTA as a subcontractor to monitor the efforts of the City of Los Angeles and its consultants during the preliminary engineering phase of the downtown people mover project. The goal was to ensure that the downtown people mover was designed and built in a cost-effective manner and that the program's goals and objectives could be achieved. The following work tasks were completed.

- Analyze downtown people mover plan
- Review system performance specifications

- Review capital and operating and maintenance cost projections
- Review project schedule
- Review provisions for safety and for the elderly and handicapped
- Review construction bid packages and bids.

Last year our firm was once again retained by UMTA to develop "Project Management Oversight Procedures." The objective of this study was to provide UMTA with procedures to assure quality control and safety on major capital transit projects and to enable UMTA's personnel to properly manage the overall project management oversight process and the procedures to be used by UMTA's project management oversight contractors.

Specifically, our staff performed the following tasks:

- Reviewed current project management oversight operations at UMTA's headquarters and regional offices. Each organization's structure and responsibilities were reviewed as well as its current federal and grantee project management monitoring procedures, policies, and reporting systems.
- Reviewed existing project management documentation to establish criteria for the quality assurance and system safety programs for evaluating such programs developed to date; recommended additions and/or modifications to technical and management areas where these programs are deficient.
- Developed an interface plan that would identify responsible parties and means of interaction among the consultant, the contractors, the grantee, and the federal representatives. The plan should identify typical products for

each phase of the capital grant project (design, construction/fabrication, start-up/testing/pre-revenue) and should specify the data and information required, its technical nature, and schedule implications for succeeding work activities.

- Developed means for enforcing quality assurance and safety programs with a typical set of enforcement steps. Conditions that should be considered would include lack of appropriate grantee and contractor staff to adequately oversee construction activity, unrealistic schedules, and inadequate budgets.
- Developed procedures for conducting project management monitoring functions, including project specifications and contract documentation, construction hardware and system testing, contractor quality assurance and quality control programs, and construction hardware and system integration, inspection, and reporting.

UMTA'S CAPITAL ASSISTANCE PROGRAMS

Since the creation of the Urban Mass Transportation Administration (UMTA) in 1964, the agency has experienced a marked expansion of its capital assistance programs to a point where virtually every mass transit project of notable size is supported by federal funds. By 1985, this capital assistance amounted to more than $2.5 billion annually and totaled approximately $30 billion over the 20-year period. UMTA's network of ten regional offices is assigned the responsibility for managing the ever-growing number of grant programs, from concept development through design and construction. Unfortunately, the number of institutional considerations and administrative details experienced in the progress of each project has also grown to the point that, with limited technical regional staff, the depth of technical oversight now available for most projects is minimal. The primary burden for project management administration falls upon the approximately 34 people in the regional offices who are either planners or engineers. A recent study has shown that a typical UMTA regional-engineer is responsible for approximately $750 million worth of projects. This project workload is far greater than workload responsibilities in any other federal grant-making agency. As one comparison, a typical project engineer in the Federal Highway Administration is responsible for approximately $83 million worth of projects. It should be noted that UMTA has already begun to remedy this situation through the retention of ten engineering firms to conduct project management oversight.

Other federal grant-making agencies have developed different degrees of project oversight all the way from minimal project interaction by staff, through certification of grantees to perform specific oversight functions on behalf of the agency, through close scrutiny of major projects by agency staff, peer groups, and/or consultants.

PROJECT MANAGEMENT OVERSIGHT

Project management oversight consists of review and audit functions performed by the granting agency over the grantee's activities to ensure that the project is properly implemented and within target ranges of cost, schedule, and system requirements.

Specifically, project management oversight should:

- Assure that the grantee is implementing the project within the approved grant, design specifications, plans, and other federal requirements

- Assure that the project has all the required elements (technical, management) for its successful accomplishment
- Assure that the grantee's organization, resources, and procedures for problem identification, resolution, and implementation are present
- Recommend, when appropriate, project areas for special study, review, analysis, or redesign.

LEVELS OF PROJECT MANAGEMENT OVERSIGHT

The Department of Transportation, Transportation Systems Center (TSC), has recently completed an effort to review and document present practices in both design management oversight and construction management oversight. It concluded that a granting agency can adopt three primary approaches to assure some level of control and protection of its investments: 1) no further oversight involvement after funding, 2) oversight of the grantee's project management process, and 3) on-site involvement in the design and construction of the project. The granting agency's role in the first option (sometimes referred to as "hands-off") is limited to providing funds for the project. Some agencies might supply or make available different levels of technical support and/or certifications. Technical support may include training, especially for construction professionals, and technology transfer and information exchange. Certification, on the other hand, is undertaken by the builder, the owner, or an independent consultant to assure the financier that the project's design and construction are as specified.

In the second option, oversight of the grantee's project management process (sometimes referred to as "eyes-on"), the granting agency becomes involved in the project through successive levels of project record reviews during development of plans, specifications, designs, construction, and operations.

The granting agency may require peer reviews, value engineering reviews, constructability reviews, adherence to federal standards, and contractor certification. The granting agency may also provide training for the grantee agency.

The third option (sometimes referred to as "hands-on") is characterized by heavy involvement by the granting agency in the course of project development. It might involve attending design meetings and reviewing reports, plans, and specifications. On-site project inspectors whose primary function is to verify project status may also be included. In some cases, a granting agency's involvement might include independent inspection to assess the performance of the grantee and his contractors.

OVERSIGHT FUNCTIONS IN THE PRIVATE SECTOR

It should be noted that in addition to those federal granting agencies which exercise project management oversight, the private sector also requires oversight on its projects.

Banks are the main entity in the private sector that take on the role of financier by making loans for public and/or private projects. Banks evaluate the risk of each loan based on such factors as past experience with similar projects and experience with the entity requesting the loan. Based on its evaluation of the risk, a bank then will establish its level and approach to project management. If the loan is for a major construction project, the loan will generally require the retention of an independent consultant to perform the construction management oversight functions. Banks do on many occasions retain their own consultants to perform an oversight function over the owner's contractors and consultants. The level of involvement ranges from "eyes-on" to "hands-on." The bank may also establish a variety of project certifications that could be required at every major step in the project, including all construction stages. It would normally perform project record reviews, schedule reviews, and site visits.

WHY PROJECT MANAGEMENT OVERSIGHT AND NOT JUST CONSTRUCTION MANAGEMENT OVERSIGHT?

The efficient deployment of any major transit project requires careful planning, management, technical monitoring, scheduling, and budgeting to ensure the project's successful implementation. This must be ensured over the entire course of the project, which typically can be expressed in the following phases:

- System Planning, including feasibility and initial planning
- Alternatives Analysis/Environmental Impact Statement
- Preliminary Engineering and Procurement
- Final Design
- System Construction
- Pre-Revenue Service/Testing
- System Start-up
- Early Revenue Operation.

Thus the implementation of a major transit project is not a single event, but consists of numerous multi-staged tasks which are conveniently grouped into phases.

Each phase has inputs and outputs. These may be as simple as assumptions, as in the case of the concept phase, dealing with parameters on demand, ridership, etc.; or documentation produced from previous phases including schedules, specifications, drawings, plans, budgets, etc.; and, finally, facilities, subsystems, and components produced from fabrication, manufacture, and construction. Processes employed within each phase act upon the inputs, either further refining them or defining new products for use in subsequent phases (if applicable). The processes of synthesis, analysis, simulation, testing, etc., are employed by the designer/builder to generate the required products of that particular phase. Various levels of review and approval are established before products are available for subsequent activities. These include the normal

Senator D'AMATO. Mr. Elias, thank you. I note for the record that we fully intend to make that change. It might appear technical in nature, but it really goes to the heart of the matter, as you move forward with meaningful project oversight. We are not strictly talking about oversight of brick and mortar construction work, but total project management oversight [PMO]. I intend to submit a technical amendment to make clear the scope of this oversight.

TIMING OF PMO

I'd be deeply appreciative if you might want to—any one of you—comment as to how you see that project management oversight relating with the local application grantee. A local transit grantee submits an application for a project. At what point does the oversight function start? What do you look at? And, what degree of detail should be in an application?

Mr. LAMMIE. I think when the project managers of the property develop this request for funds and this grant application, that they define the project in great detail. I don't think you reach the point of major commitment until you are well into the preliminary design process.

I think the appropriate point to apply the PMO, and I agree with PMO, as opposed to CMO, is at about the point where you start preliminary engineering. They can evaluate design quality procedures, which is where your construction cost growth starts. They will then also be able to observe the development of construction management plans which should be developed sometime prior to the detail design.

Senator D'AMATO. What kind of conflict, if any, do you see? I see all of you are nodding in apparent agreement. Do you agree with what Mr. Lammie has just said?

Mr. POLUTCHKO. Yes, Senator. I think he's exactly right. The participation of the PMO on behalf of UMTA should be in the design phase. Specifically, perhaps, a participant in the design reviews, whether they be 25, 50, 75 percent design stages, but the PMO should be involved at that point.

Senator D'AMATO. Let's take it at that point. Let me raise the next issue. What kind of conflicts do you anticipate? Will they be the kind that will impede a project's progress or that you would envision a grantee becoming upset with?

Mr. POLUTCHKO. I don't think so, Senator. This concept is not unlike what's been used in the aerospace and military development programs for a long, long time. For example, the Air Force has always used someone like TRW or Aerospace Corp. as kind of their PMO agency, participating in design reviews and reviews and approvals on behalf of them.

Mr. LAMMIE. Certainly, if there were an opportunity for conflict any time, certainly, this cartoon demonstrates why 2 years ago I was initially opposed to this conflict, because you get peer overviewers.

Senator D'AMATO. Maybe that's the time to have that conflict before you get into this thing head on. What do you think?

Mr. LAMMIE. I think what you've got to do is make sure that your oversight consultant reports to UMTA.

Senator D'AMATO. You heard the gentleman from Michigan say that the PMO should be reporting to the grantee. What do you think of that idea?

Mr. LAMMIE. He should not be reporting to the property, because, if he does, he's not really providing an overview. This is an objective review of the grantee's plan. The overview consultant is not doing design review. I don't agree with that. The consultant is overviewing the design review process, and at the most, spot checking, just as he would spot check during construction. The oversight consultant must not get involved in the decision process, but if he's got a good idea, he shouldn't be prohibited from passing it on to UMTA. Mr. Martin objected to that earlier, but there's got to be a clear distinction of responsibilities. I won't say that the PMO is isolated, but he looks at what you're doing while remaining at arms length.

This is being done on the Santa Clara light rail project in California, and it's working quite well.

Senator D'AMATO. Mr. Leonard.

Mr. LEONARD. I really don't think in the design phase—well, two things. This does not have to be a large organization, of 105 people. It's closer to 5 than it is 50. Probably the fewer the better. The involvement should be—the stronger involvement should be in the preliminary, what I call design stage. The more cooks you've got in the broth during the construction phase, when 90 percent of the money is being spent, the more you're going to delay the thing and stretch it out and confuse the issues, and so forth.

Senator D'AMATO. So I take it that all of you agree that a strong presence of the PMO and a careful review of ridership projections and design elements is important.

Mr. LEONARD. It's very strong in this report. It ought to be incorporated, and I notice my colleague on the right, I read his testimony, and I don't think we rehearsed any. He also endorsed this report. And they're a pretty qualified bunch, these ones on the right. I think this would be an excellent vehicle to solve half our problems.

Mr. ELIAS. I agree with what has been said, Senator. I think there's some need to be involved in the early projection of ridership. I think UMTA needs some assistance in the review of designs as they progress and some form of presence during construction. But the extent depends on the project complexity, on the locality and the experience of the agency. If the grantees have experience with this kind of project, in doing that, obviously, the presence of the contractor—the PMO contractor—will not be as extensive as in a case where they don't have experience.

Senator D'AMATO. What would you do in New York City? They had experience. Would you merely permit them to continue with business as usual?

Mr. ELIAS. Experience and ability are two different things. It depends on what kind of experience they have.

Senator D'AMATO. That's a diplomatic answer. [Laughter.]

Mr. LAMMIE. You had asked, whether the PMO should be involved in design review. I would express a note of caution involving a role for the oversight consultant in design review. Let's take a typical project like the Atlanta Transit System, the MARTA internal reviews and approvals established by the grantee and its contractors as well as project management oversight methodologies employed by the grantee and the financing agency. They might include value engineering, design reviews, peer reviews, and quality assurance/control audits. The processes employed within each phase lead to various combinations of parameters to be evaluated and either accepted or rejected. Where necessary, parameters are revised and changes are made and fed back to determine their validity relative to project requirements and goals.

If they are found to be valid, the refined parameters are used to generate the outputs of that particular project phase. In intermediate phases, the outputs from the previous phase generally provide input to the succeeding one. Developing the performance specifications during preliminary engineering, for instance, requires the input of system definitions, performance requirements, and patronage forecasts in order to define other parameters such as vehicle/consist size, headways, capacities, speeds, travel time, and dwell times. During preliminary engineering, simulation and analyses are employed by the designer to define the specification parameters. Various alternative solutions are evaluated and through iteration a most favorable solution is recommended to satisfy the requirements. This then forms the basis for the performance specifications.

The final design phase similarly receives material developed during preliminary engineering in order to synthesize the products needed in construction. The final master schedule, for example, depends on the refinement of preliminary plans through design and analysis by the designer and the results of peer and design reviews and value engineering imposed by the owner. Inputs to this process include the preliminary master schedule, budget, management plan, procurement plans, and construction plans. These documents similarly are revised and updated as part of the final design process to be used in the construction phase.

As the foregoing discussion illustrates, the development of a major transit project is a long, complex set of elements that must be successfully completed as the various project phases proceed. The successful completion of each phase is integrated with and dependent on other phases. It is thus clear that if the project management oversight function is to succeed, it must cover and recognize the importance of each project phase (not just the construction phase) and the elements of each phase, and it should clearly delineate the interface of all phases. Therefore, we recommend that the word "construction" be replaced by "project" to accurately reflect what we believe to be the intent of this Bill.

POTENTIAL RISKS

I have recently read that UMTA has identified 25 projects as new starts and extensions that are in either final design, construction, or start-up operations. Approximately $9.0 billion in federal funding is required to complete these projects. In addition to the new starts and extension category, UMTA, as we understand it, is currently responsible for maybe another 8,000 active capital improvement projects totaling approximately $9 billion. Many of these projects are complex and require significant, thorough, well thought out input and participation on the part of UMTA Headquarters and regional office staff.

Given the size and complexity of these major transit projects, potential risks associated with them can be said to be only magnified by the lack of close UMTA technical oversight. Barring close monitoring by the agency, it must risk relying on qualitative assurances and, to some degree, the past project history of the grantee to determine whether the grantee may successfully carry the project to implementation.

The following provides a brief discussion of the risks to UMTA associated with each phase of a project if inadequate oversight is exercised.

System Planning

This beginning phase is perhaps the most important in that the initial parameters of the project are established. During this phase, local officials examine long-range urban development trends, collect travel data, forecast needs, and evaluate regionwide transportation policies and investment options. Based on preliminary assessments of travel patterns, a range of potential solutions are evaluated. Goals and objectives are identified, alternatives are initially weighed, and state and local officials and the citizenry become involved. The conceptual system is defined with a proposed set of promising alternatives of route alignment, hardware description, and operational requirements. Early designs may be formulated and patronage forecasts for the conceptual system are made. Preliminary projections of life cycle costs, economic activity, expected revenue, funding, and scheduling are addressed.

Clearly, system planning development carries with it a certain amount of risk. Mistakes made at this stage will be carried throughout the entire life of the project. Improper analyses or assumptions based on the wrong information may lead to a transportation system's being selected that does not satisfy the demand. For example, using the wrong assumptions regarding passenger demand can lead to a technology's being selected that will not satisfy or will over-satisfy the actual patronage. Building a system that cannot meet the present demand will lead to an early and costly expansion, while an overdesign will result in a system that was not needed or was costlier than necessary.

The savings to UMTA by the use of project management oversight services will result from ensuring that UMTA receives the entire, accurate picture of the worth of a proposed project. The project management oversight functions would include review of the grantee's work to determine if all relevant alternatives have been evenly evaluated; perhaps further possibilities for consideration would also be identified.

Savings to UMTA by the use of project management oversight will also be made through the assurance that correct data and proper methodology are used in the conceptualization of the system, its benefits and its costs. Assurance can be given that all potential alternatives are considered and that the best solution in terms of project performance and cost is selected. Significant cost/benefit can be achieved through the selection of the most beneficial project and rejection of those projects with limited potential or higher costs.

Alternatives Analysis/Environmental Impact Statement

An assessment of the benefits and drawbacks of various alternative transit modes (including do nothing) is made in this phase as well as an analysis of the environmental impacts. In the alternatives analysis phase, the priority corridor is studied in detail with respect to alternative solutions to the problems identified in system planning. The analysis also assesses each alternative relative to cost and effectiveness, measured by the degree to which each alternative accomplishes local and federal objectives. The analysis is based upon determined long- and short- term beneficial and adverse effects for all alternative transit systems. Parameters such as comparative costs, operational characteristics, construction, ridership, revenue, socioeconomic impacts, effects on existing transportation usage, etc., are addressed. Environmental consequences of land use, pollution, energy utilization, noise, and impacts on historical properties are also assessed. Risks associated with this phase deal mainly with ensuring that all factors dealing with the alternatives analysis be accurately addressed for UMTA to decide whether to proceed with the project design phase. UMTA's policies and procedures in developing the alternatives analysis and Environmental Impact Statement have worked relatively well in the past.

Preliminary Engineering

The preliminary engineering phase involves the development of system performance specifications for vehicles, stations, and guideways and the development of grantee procurement bid packages which define the system that suppliers will respond to. The bid package represents the preliminary document upon which the grantee and suppliers will contract to implement the project. Because its provisions will eventually constitute the contractual agreement between the two, a great deal of the risk to the eventual success lies in the proper completion of this phase.

The bid package generally consists of documentation such as contract approach; work statement of efforts to be performed; interrelationships and responsibilities of the various project participants; bidding instructions and evaluation criteria; preliminary project schedule; technical provisions/specifications; preliminary drawings of the alignment, stations, and other fixed facilities; terms and conditions proposed by the grantee for the final contract; etc.

Although the project expenditure up to this preliminary engineering phase is still minimal, preliminary engineering is traditionally the phase during which UMTA makes the go/no-go decision on total funding. Risks associated with this phase deal mainly with the appropriateness of the design criteria, the preliminary procurement plans and bid packages, and the projected capital costs.

Final Design

Final engineering represents the phase when the conceptual design of the system is further defined to that which will actually be implemented. Various operational analyses are performed including those on availability achievement; safety and security; operations, maintenance, and training; passenger information, etc. Management plans for quality assurance and testing, schedule, cost, document control, configuration management, etc., are generated. Final designs of equipment and facilities are made, including vehicles, computers, software and other control equipment; power distribution; fare collection; guideways, stations, maintenance facilities; utility relocation; graphics and communication systems, etc. Procurement of many long delivery time items such as vehicles, fare collection, and computer software is initiated. Construction bid packages are prepared.

Risks associated with this phase center on ensuring that the final designs will work, will comply with performance specifications defined in the previous phase, and are constructable. In addition to vehicle design, fixed facility design is also very critical to ensure that guideways, foundations, and columns, for instance, meet structural, aesthetic, clearance, and other concerns and are procured at a reasonable cost. The designs must be consistent with the state of the art in construction technology. Monitoring of the grantee's activities on a day-to-day basis, review of technical reports and documentation, attending design reviews and constructability review meetings, and recommending alternative courses of action by the project management oversight will minimize the risks of later redesign and retrofit. This would translate to savings in federal and local dollars.

Construction

The building of fixed facilities highlights the activities of this phase. These facilities include guideway spans, columns, and foundations; stations; maintenance; and central control facilities. Installation of guideway elements of the command and control, power distribution, and fire protection/evacuation systems is completed. Operating and maintenance training of the grantee's personnel begins.

Inadequate quality assurance for construction of facilities and non-adherence to schedules pose the greatest threats to UMTA in this phase. Without close monitoring, inspection, and reporting, errors or omissions by construction contractors can lead to costly repairs/retrofits during construction or abnormally high O&M costs during operation. Problem resolution mechanisms must be set up and adhered to. The construction schedule must be closely adhered to and monitored to ensure that delays by one contractor will not restrain the efforts of others, causing additional construction delays and costs. The need for change orders can also have a substantial impact on construction costs and schedule.

The project management oversight functions will offer savings by assisting the grantee and overseeing the monitoring, inspecting, reporting, and problem solving associated with the facility's construction. The project management oversight functions would provide support to ensure that those construction activities that were supposed to have been done were in fact completed within design requirements. Problems and disputes that are addressed expeditiously would offer additional savings to the grantee. The construction phase offers a large potential for savings by assuring that specifications are followed in the construction of fixed facilities. Failure to follow specifications, such as in concrete work, results in large costs overruns when completed work must be removed and replaced.

Pre-Revenue

The pre-revenue phase consists of integration testing, verification, and demonstration of the entire system. Testing of various subsystems and components has been progressing throughout the final engineering and construction phases, but testing of the entire system commences during this phase. Tentative acceptance of the system will be made upon completion of this stage.

Risks still remain in this phase as the subsystems are integrated and tested together for the first time. Redesign and retrofit of components are often required, and these activities must be monitored closely to ensure that the "fix" does not cause other problems and they will function in a safe and reliable manner.

Start-Up

Extended testing and operation of the system commence with this phase to ensure that the system operates safely and reliably prior to opening for revenue service. Availability is demonstrated through operation under normal revenue service conditions. Final acceptance of the system is made with the achievement of the specified availability requirement. Risks at this stage are similar to those in the pre-revenue phase.

Savings are expected to be lowest here when compared to other project phases if proper project management oversight function utilization is made. The project management oversight function could provide assistance that would expedite the resolution of problems, recommend "fixes," and speed the system acceptance process. Problems at this phase are expected to be those dealing with subsystems such as communications, automated train control, electrification, etc. Those problems can be expected to be most troublesome and to impede smooth operation and affect the safety of the system. Savings are achieved through assuring that the system is meeting all its specification requirements, especially those dealing with reliability, maintainability, and dependability. In addition, PMO could help assure that those items that are under warranty remain the contractor's responsibility and that the specified reliability and maintainability have been achieved.

Summary of Potential Risks and Savings

Exhibit I represents the various project phases typically experienced in major transit projects, the average

EXHIBIT I
AVERAGE EXPENDITURES AND ASSOCIATED RISKS FOR EACH PHASE IN A PROJECT

PHASE	TOTAL FUNDING	POTENTIAL RISK TO UMTA OF INADEQUATE INVOLVEMENT
System Planning	0%-1% of Cost	Low
Alternatives Analysis	0%-1% of Cost	Medium to High
Preliminary Engineering	2%-3% of Cost	High
Final Design	8%-10 of Cost Cost	Medium
Construction/ Fabrication	85%-90% of Cost	High
Testing	> 1%-2% of Cost	Medium
Start-Up		Low
Revenue/Warranty		Low

expenditure for each phase, as well as the potential risk to UMTA due to inadequate involvement. As discussed above, the inadequate involvement of UMTA in project management oversight reduces its opportunities to influence those risks and associated costs. On the other hand, through adequate project management oversight involvement, UMTA will be able to affect the final project cost in two ways: 1) by cost reduction and 2) by cost control.

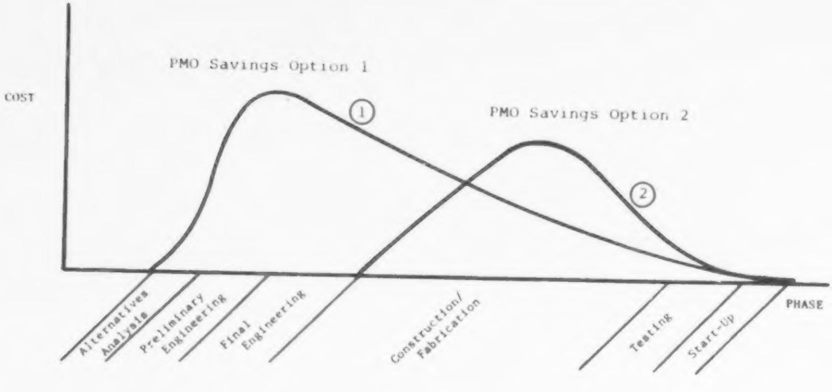
The early implementation of project management oversight could result in cost savings. Exhibit II graphically represents the cost savings that might be experienced. (These are illustrative and are not intended to represent true ratios or absolute values.) Curve 1 shows the potential savings when project management oversight is implemented throughout the different phases of the project, i.e., from concept formulation through start-up. Curve 2, on the other hand, shows those savings expected when project management oversight is introduced at the construction/fabrication phase. The potential savings under the first option (Curve 1) are greater than the potential savings under the second option (Curve 2). The increased savings would be due to the project management oversight contractor's cost reduction effort during the planning and design phases of the project. Savings from the project management oversight contractor's cost control of the construction/fabrication activities would be realized in both options shown in Curves 1 and 2. Furthermore, most of the savings under the first option occur earlier in time than those savings under the second option (Curve 2). It should be noted that some of these savings are currently being realized by UMTA due to the oversight effort it exercises at the early planning stages.

IN SUMMARY

From the previous discussion it is certain that the need is indeed there for UMTA to increase its technical

EXHIBIT II
CONCEPTUAL COST SAVINGS

OPTIONS FOR IMPLEMENTING PMO



involvement in major transit projects. Primary motivation for increased involvement includes the following:

- o Ensure the transportation needs of the project are met (from the very beginning through value engineering, peer reviews, and detailed evaluation of alternatives)
- o Ensure that proper designs are considered and followed and that mistakes are not carried throughout the project
- o Ensure that quality assurance and safety programs are in place and are adhered to during the fabrication and construction phases
- o Ensure the timely reporting and updating of key technical parameters affecting cost and schedule.

As a granting agency, UMTA has an interest in the program oversight role to ensure that projects are completed as planned after funding is provided to the grantees. Because of staff limitations, UMTA has had, until recently, minimal involvement in the oversight role beyond administrative and statutory issues. A project management oversight function to monitor and review in detail major transit capital project(s) from concept through design and construction can greatly be enhanced by the statutory and budgeting support that Senate Bill 1931 is proposing. This is a good Bill - good for UMTA, good for the grantees, and indeed good for the country. We wholeheartedly support it. Thank you for the opportunity to speak and for your patience.

project. You had the section designer doing design. You had the general engineering consultant doing design review. You had a 120-person client staff doing design review. You did not need another level of design review.

What you need is someone to ensure that the project planning document is being followed with respect to review, with respect to dealing with the review comments and with respect to performance of independent checks. You used the words in your opening statement that the job of the CMO is to advise UMTA if the grantee is not following its construction management plan and the same applies to the design plan. The oversight assures that the grantee is following the plan. The oversight consultant is not providing another level or layer of design review and design check.

Mr. POLUTCHKO. That's precisely correct. I hope nobody interpreted my saying that the PMO is involved in directing the design review. I didn't mean it that way. I meant he has the same oversight role to assure UMTA that the grantee is, in fact, making his plans and following his plans and revising his plans in cost, schedule and function, as those changes occur.

Senator D'AMATO. Let me thank all of the panelists for giving us their expertise, not only in their testimonies but also in their written presentations.

I am going to ask staff to get a copy of the document that Mr. Leonard has talked about. If you'll leave it with us, we will keep it in our committee file.

I'd like to indicate that the record will remain open for 3 weeks to receive materials requested and the answers to written questions. Senator Mattingly has submitted some written questions. Other Senators may also have written questions.

Senator D'AMATO. We thank those of you who have taken of your time to help participate and give us better insight into this problem. We're not looking to make major capital projects more difficult or more cumbersome to build, but rather to establish a process for meaningful Federal oversight. Our goals are to reduce delays and see to it that Federal assets are used in a manner which will bring credit to the transit program. Unfortunately, I have observed some very costly boondoggles that discredit the transit program and make it more difficult to keep the consensus of support for funding mass transportation.

In order to maintain that consensus, we need continued congressional support. We must see to it that there is in effect a plan that requires this kind of project management oversight.

You have the thanks of this Senator as well as, I'm sure, the other Senators on the committee. We look forward to, hopefully, marking up this bill within a reasonable period of time. What's a reasonable period of time in the Senate? You can never tell what that will be, if that is one of the things you are concerned about.

Mr. Leonard, in particular, I hope we are not creating a whole new bureaucracy that some years from now we'll have to fight our way out of. I agree with you on that.

But you have the thanks of the committee in presenting what I think is well-balanced testimony. It's our job to see if we can implement the suggestions that we've heard here today. I would ask if you would continue to cooperate in that effort. I know that my staff and other staffs will probably be contacting you for your continued advice on this matter.

Thank you very much. The committee stands in recess.

[Whereupon, at 10:50 a.m., the hearing was adjourned.]

[Responses to written questions follow:]

QUESTIONS OF SENATOR MATTINGLY FOR
U.S. ARMY CORPS OF ENGINEERS

LLOYD A. DUSCHA

Question 1. I am aware that the United States Army Corps of Engineers presently uses construction management plans similar to those proposed in this Bill. Could you please tell the Committee how effective these are, wha problems have been encountered in the past, and what problems may be foreseen in the future?

Response: Construction management plans are effective to the extent that they are implemented. As I stated in my statement, perhaps the greatest effect evolves from the process of developing the plan. It is here that potential shortcomings are identified and procedures established to deal with the problems. On those complex problems where we have used formalized plans, they have been fairly effective, primarily I would say because a plan tends to define respective responsibilities. As for the problems that may have been encountered, they center around maintaining a capable staff dedicated to the project so as to insure proper implementation and supervision of the plan. As for predicting problems for the future in the construction field, one can almost be assured that some unexpected event will occur. Therefore, the plan must be flexible and must provide an accountable means for dealing with such event.

Question 2. You mentioned in your testimony that this legislation should be designed to put more emphasis on the front end of the job. Do you foresee this increasing costs of the project?

Response: Sir, dedicating more effort to the front end of the project does have a cost implication. Whether it would increase the cost significantly depends to a great extent on the degree of management and review already built into the recipient organizations normal procedures. In any case the costs added to a project would be a small increment, perhaps 1 - 2 percent of the total. I submit that such is well worthwhile if it precludes larger cost and time overruns. In the experience of the Corps of Engineers, we have never regretted such an investment; however, we have on occasion questioned an under-investment.

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